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DASYSCYPHA AGASSIZII ON PINUS STROBUS

WALTER H. SNELL

(WITH PLATE 29)

In connection with damage studies of the white pine blister rust in the Adirondacks for the past few years (**4**, **5**), the writer has been obtaining incidental data of various sorts for possible future use. For example, certain observations have been made on the secondary fungi on the blister rust cankers (**5**). The original interest was in the possibility of a certain amount of biological control of the blister rust and in other epidemiological relations.

The fungi commonly found upon the dead areas of the blister rust cankers are a species of *Phoma* (imperfect stage of *Caliciopsis pinea* Peck) and *Cenangium Abietis* (Pers.) Rehm. *Stereum sanguinolentum* Alb. & Schw. is found only rarely on the cankers, not so often as it is found on dead parts not infected by *Cronartium ribicola*. In the summer of 1927, another fungus was found to be quite common on the cankers in a white pine plantation that was being studied near Dannemora. It was identified for the writer as *Dasyscypha Agassizii* (Berk. & Curt.) Sacc.[1] (**5**).

At the time of this discovery, it was thought that this fungus occurred only on *Abies*, as stated by Saccardo (**3**), and that the identity of other hosts might be subject to question. In view of the uncertainty as to the occurrence of *Dasyscypha Agassizii* on *Picea*, a thorough search was made at the Dannemora plantation, where balsam fir and red spruce grow in close proximity to

[1] The fungus was first sent to Dr. E. A. Burt through an error, and later to Dr. F. J. Seaver. Both identified it as noted.

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the planted pines, under what are apparently very favorable conditions for the fructification of this fungus. It was found in large quantities on the fir, upon which in some cases areas as large as two square feet were thickly covered with large apothecia. After a prolonged examination of fallen and standing red spruce, fructifications were found on two branches of a fallen tree that were very close to an infected balsam trunk and well protected by debris to provide very moist conditions. The fruit bodies were few and small, but were in good condition. A few old fruit bodies were likewise found.

Following this success, nearby planted *Pinus sylvestris* was examined. On one shaded-out branch were found three old apothecia that appeared to be very similar to the old ones found upon spruce just previously, but their condition was such that a definite determination was impossible. No claim can therefore be made.

An examination of a few herbaria in 1927 showed records of the occurrence of *Dasyscypha Agassizii* on several hosts, including those named above. Most of the collections in the New York Botanical Garden are upon *Abies*, with a few upon *Picea*, *Pinus monticola* and a pine presumably *Pinus Strobus*. All but two of the specimens in the Farlow Herbarium at Harvard are upon *Abies balsamea*. One of these was noted in Farlow's handwriting as "on hemlock" (*Tsuga canadensis*). The other exception is one of the Curtis Herbarium specimens on *Abies Fraseri* from Black Mountain or the Black Mountains ("*Mont. Nigr.*" in Curtis' hand), North Carolina. On the packet, however, is also written "*Peziza crocea* ex Berk." (cf. **1**, p. 160). Saccardo accepts this latter view of the identity of the specimen (**3**, p. 261), listing the collection as *Phialea* (*Peziza*) *crocea* (Schw.) Sacc. Examination of the specimen shows that this disposition of the fungus is probably somewhat nearer the truth than calling it *Dasyscypha Agassizii*, on account of the smoothness of the apothecium and the small size of the spores (5–6 × 2.5–3 μ).

The collections of this fungus made by Dr. L. O. Overholts are all on *Abies balsamea*, as are those in the herbarium of Dr. C. W. Dodge at Harvard.

The specimen in the Brown University Herbarium is on

Abies balsamea (from the Curtis collection). There is another specimen labelled *D. Agassizii* on *Abies lasiocarpa* (Fungi Columbiani no. *4530*), collected at Silver Lake, Colorado. This determination is incorrect, however, inasmuch as the hairs on the outside of the apothecium are dark colored instead of hyaline.

The largest number of collections of this fungus, made for the most part in 1927 and 1928, is in the herbarium of the Office of Investigations in Forest Pathology, United States Department of Agriculture. Through the kindness of Dr. Perley Spaulding, these specimens were sent to the writer for examination and even the most recently acquired data were provided for use in this paper. The specimens are upon *Abies balsamea*, *Pinus Strobus*, *Pinus monticola* and *Picea mariana*. There are also two upon *Pseudotsuga taxifolia*, but the writer is not certain that the species is *D. Agassizii*. The apothecia have a somewhat different appearance and spores have not been found by the writer.

The usual host of *Dasyscypha Agassizii* appears, therefore, to be *Abies balsamea*, but it is apparent that it may occur occasionally on other Gymnosperms. It seems to occur more often upon white pine than upon any other host except balsam fir. It was found in considerable abundance at Dannemora, New York, in 1927 as a secondary fungus on blister rust cankers and also to a lesser extent on white pine bark not infected by *Cronartium ribicola*. On this plantation, 103, or about 10 per cent, of the blister rust cankers were invaded by secondary fungi, and upon 78 of these 103 *D. Agassizii* was fruiting abundantly (see PLATE 20). Search was made for this fungus on white pine elsewhere in 1927, but it was found only in the writer's Kelm Mountain plot near Warrensburg, New York, and not so abundantly there.

In 1928, however, further search revealed it in very small amounts on the following experimental plots in New York: Horicon at Horicon; Burdick near Warrensburg; Harkness, Downes and McCormick near Keeseville; Sternberg near Central Bridge. It was found in great abundance again at Dannemora. One dead pine branch 1 inch in diameter was covered all over for a distance of 20 inches with small and medium-sized fruit

bodies. On another young pine in this plantation, from which a piece of bark with fruit bodies had been removed in 1927, apothecia were found growing out of the exposed sapwood.

In connection with this matter of the hosts of *Dasyscypha Agassizii*, there is one point of interest. Berkeley, in the original announcement of the species (1) as *Peziza* (*Humaria*) *Agassizii* Berk. & Curt. collected by Agassiz near Lake Superior (Calumet as noted by Curtis), makes no reference to a specific host, but notes simply—"on bark." Saccardo, as noted above, makes the host *Abies*. In Curtis' handwriting on the packet containing the co-type specimen in the Farlow Herbarium are these words —"in cort. Pini?" The other specimen mentioned by Berkeley as collected by Oakes in New England (White Mountains according to Curtis on the packet) is on *Abies balsamea*. It is difficult to discern whether the host bark of the former (the co-type) specimen is white pine or balsam fir, but in view of the foregoing discussion it would be odd if the host of the type specimen happened to be white pine instead of fir.

It seems strange that this fungus has not been seen before on white pine. Many workers, including the writer, have been poring over blister rust cankers for years and several have paid more than passing attention to the secondary fungi on those cankers. It is more than possible that it has been passed by as some other fungus, as for instance a stipitate *Stereum*. Most blister rust workers, in common with phytopathologists in general, have no interest in the wood-inhabiting Hymenomycetes and no knowledge of them whatsoever. But even if there were some interest, it would be easy to ignore this *Dasyscypha* as some other form, more especially when it is dried and shriveled and in small numbers. In fact, the writer, engrossed in his other work, ignored it as a "*Stereum*" at first, until it was noted moist and expanded a day or two later and examined at leisure in the field office. But the writer does not recollect seeing anything like it before in several years of contact with white pine.

It does not seem that moisture could be a determining factor in its invasion of white pine. The fruit bodies of *D. Agassizii* were found, to be sure, only down low on the 12-year-old trees, well protected by foliage, and the summer of 1927 was an un-

usually moist one, especially in the northern Adirondacks during June and July. But there have been other moist summers before now. It was thought at first that latitude might be a determining factor, as the fungus was found not far from the Canadian line (at about latitude 44° 45′) and at an altitude of 2,100 feet. The fungus was located later in 1927, however, at Kelm Mountain near Warrensburg (about latitude 43° 33′), at an altitude of 1,200 feet. It may be, of course, that this *Dasyscypha* can attack white pine only in its northern limits, if these isolated instances can be taken to have any significance.

As a matter of fact, the range of the fungus appears to be limited for the most part to sub-boreal habitats. Berkeley (**1**) and Saccardo (**3**, p. 438) record collections of this fungus from Lake Superior and New England (Calumet and White Mountains respectively, according to Curtis). The specimens in the New York Botanical Garden Herbarium are from Newfoundland, New Brunswick, Ontario, Maine, New Hampshire, New York, Pennsylvania (collected by Overholts), Michigan, and Wisconsin. There are also specimens labelled *D. Agassizii* from Colorado and from Montana. The former is no. *4530* of the Fungi Columbiani, the same as the specimen in Brown University Herbarium and is not this species. The specimen upon *Pinus contorta* from Montana is not *D. Agassizii*, for it has spherical spores (perhaps a *Lachnellula*). The Farlow Herbarium contains the two collections mentioned by Berkeley and Saccardo, the doubtful one from North Carolina and one from the Adirondacks in New York (all in the Curtis Herbarium), and other collections from Newfoundland, northern Maine, the White Mountains in New Hampshire, northern Vermont, and a very questionable one from Iowa. This latter specimen is upon an angiospermous host (probably rosaceous), and is apparently some other *Dasyscypha*. Dodge's collections are from the Gaspé peninsula in Quebec. The Curtis specimen in the Brown University Herbarium is from the White Mountains. The specimens in the collections of the Office of Investigations in Forest Pathology are from Newfoundland, northern New York, northern and southern New Hampshire (Mount Washington to Keene), northern Vermont, Montana, Idaho, and Ipswich, Massachusetts.

Most of Overholts' collections are from near Mount Washington, New Hampshire, with one from Pennsylvania.

Most of these specimens are from north of 43° 30′ latitude, and many of them from points at some distance above sea level. The stations for those from southern New Hampshire and Massachusetts are at about latitude 42° 40′ to 42° 50′. The Iowa collection can be excluded from consideration on the ground of its identity. The North Carolina specimen can also probably be excluded, although if it should be found to be *D. Agassizii*, the altitude of its station might compensate for its southern latitude (about 35° 35′). According as we interpret Curtis' Latin as the town of "Black Mountain" or as the "Black Mountains," the altitude would be between 2,000 and 5,000 feet respectively and, as such, not so far out of its normal range. Outside of the foregoing, the Pennsylvania specimens are the only ones from very far south of this line. The Pennsylvania specimens are from a point about 41° north latitude and about 1,000 feet above sea level. The stations for the Pennsylvania and southern New Hampshire and Massachusetts collections apparently represent the southernmost limits of the distribution of *Dasyscypha Agassizii*, and are south of the sub-boreal zone. Except for these collections, it appears that this fungus is typically sub-boreal in its habitat, as stated above.

According to Saccardo (**3**) the ascospores of *Dasyscypha Agassizii* measure 6.5–7.5 × 4 μ. Berkeley (**1**) originally gave the size as ".0002 long" (a little over 5 μ). On one packet in the Farlow Herbarium, the size of the spores from a specimen on *Abies* is given as 5.7–7.5 × 3.8 μ, while another is given by Farlow with a question mark as 7.5 × 2.5 μ. The spores from the writer's specimens on fir were found to be 6–9 × 3–4.2 μ, most of them 7–8.5 × 3.5 μ, with occasional ones up to 10.5 × 5.25 μ. The spores from white pine were found to be somewhat more slender than the accepted sizes, as noted by Seaver in his original determination, measuring 6–9 × 3–3.5 μ, with most of them 7–8.5 μ long. Spores from specimens on spruce were 6.5–7.5 × 3–3.5 μ. The asci are 70–95 × 5.5 μ.

Cankered bark with *Dasyscypha Agassizii* was sectioned, stained with the Fianeze stain, and examined for the mycelium.

The mycelium takes the light green stain well and can be found readily enough near the apothecia, but it is not abundant or striking. Beneath and very near the bases of the apothecia, some cells are quite solidly filled with the fine, much branched hyphae. A few cells away, there may be three or four branching hyphae in a cell now and then, and beyond that point, a single filament crossing a cell here and there. Hyphae have thus far been found 15 or 20 cells in from the outside, but not at all in the innermost bark. The hyphae must penetrate more deeply than has been discovered thus far, however, because, as noted above, fruit bodies were found in 1928 upon exposed sapwood from which bark bearing this fungus had been removed in 1927.

The hyphae are very fine, measuring about .5–1.2 μ or occasionally 1.5 μ in diameter. No cross walls and no other detail could be made out in the stained hyphae. Branching is quite abundant and is mostly at nearly right angles, the branches often being considerably broadened at the point of departure from the original hypha. The mycelium has a cobwebby appearance in the empty cells. As far as could be determined, the hyphae are somewhat constricted in the passage through the host cell walls.

There were a few hyphae of larger diameter in the sections and these were probably hyphae of *Cronartium ribicola*. It is needless to point out that there is no danger of confusing the hyphae of *Dasyscypha Agassizii* and *Cronartium ribicola* (**2**). Further, it seems likely that the two fungi will not often be found in the same tissues, either because of the relative scarcity of the ascomycete or because of the different conditions under which the two vegetate.

For courtesies extended in examination of herbarium material, in furnishing information by correspondence, or in allowing the use of data upon collections, the writer wishes to express his gratitude to the following: Dr. H. H. York of the New York Conservation Department, Dr. F. J. Seaver of the New York Botanical Garden, Dr. Perley Spaulding of the Office of Investigations of Forest Pathology (Northeast Forest Experiment Station at Amherst), Dr. C. W. Dodge of the Farlow Herbarium, and Dr. L. O. Overholts of Pennsylvania State College.

SUMMARY

Dasyscypha Agassizii (Berk. & Curt.) Sacc. was found to be very abundant upon planted *Pinus Strobus*, especially on blister rust cankers, and to occur also on several pine lots studied.

This fungus has been known in literature only upon *Abies balsamea*. This host is found to be the usual one for the fungus, but collections are here noted also upon *Tsuga canadensis*, *Pinus monticola*, *Picea rubra*, *Picea mariana*, and possibly *Pseudotsuga taxifolia* as well as *Pinus Strobus*.

The habitat of *Dasyscypha Agassizii* is apparently sub-boreal. The herbarium specimens available were from north of 43° 30′ north latitude for the most part (excluding two doubtful forms), the exceptions being from Pennsylvania at 1,000 feet, and from Massachusetts and southern New Hampshire.

The ascospores of material upon white pine and spruce were found to be somewhat more slender than given by Saccardo.

A description of the mycelium in blister rust cankered white pine bark is given.

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3. **Saccardo, P. A.** Sylloge Fungorum omnium hucusque cognitorum. **8**: Pavia, Italy.
4. **Snell, W. H.** Blister rust in the Adirondacks. Jour. Forestry **26**: 472–486. 1928.
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PLATE 20

Fruit bodies of *Dasyscypha Agassizii* (Berk. & Curt.) Sacc. on a blister rust canker on *Pinus Strobus*, Dannemora, N. Y. Photograph taken during moist weather. About natural size.

NOTE. Since the preparation of this manuscript, Mr. A. B. Seymour has called to the writer's attention the presence of another collection in the Farlow Herbarium, which for unknown reasons was overlooked on previous inspections. This collection is on *Pinus Strobus* from Maine on September 15, 1923. This, therefore, antedates the writer's finding of this fungus on White Pine.

THE TAXONOMY OF PEZIZA QUERNEA

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(With Plate 21 and 2 Text Figures)

Peziza quernea Schw. has been gathered but rarely since the original collection and any interpretation of its structure and taxonomy has been prevented largely by a lack of specimens. Available material, moreover, has not been in satisfactory condition for adequate study. A specimen from Lakeochee, Florida, in exceptionally good condition, shows certain characteristic features which are of taxonomic significance.

The fungus appears to be distinct from *Cenangium*, to which the species has heretofore been referred, in the presence of an epithecium and of conspicuous excipular ridges which persist as claw-like projections on the margin of the opened disk. This ridged exciple resembles that of *Godronia*,[1] but the fungus differs in the thicker, more carbonaceous texture, in the simple ascospores and in the subapplanate form when mature. Among the genera of the Patellariaceae it is most suggestive of *Starbaeckia*, which, however, lacks the regular excipular ridges and possesses much branched paraphyses. Since its most obvious relationships are with *Cenangium* and *Godronia*, the species *Peziza quernea* is retained in the Cenangiaceae and is taken as the type of a new genus.

GODRONIOPSIS, n. gen.

Apothecia sessile or subsessile, seated upon a black stromatoid base, at first closed, subspherical, later cup-shaped to patellate, corky-leathery to subcarbonous when dry; exciple with prominent vertical ridges from the margin to the base; asci opening by a

[1] *Godronia* Moug. (Consid. génér. végét. spont. Dépt. Vosges, p. 355, 1845) as typified by *G. Muhlenbeckii* Moug. & Lév. Even though Rehm (Ascomyceten, p. 240–241, 1896) places this species in his subgenus or section *Muhlenbeckia* rather than in *Eugodronia*, any discussion of or comparison with the genus *Godronia* must depend upon this type species. *G. Muhlenbeckii* is characterized by the furrowed and also ridged exciple, urceolate apothecium, linear, pluriseptate ascospores, and simple, filiform paraphyses.

pore, 8-spored, iodine-; spores simple, hyaline; paraphyses septate, simple to branched, somewhat inflated toward the apices, forming an epithecium.

Godroniopsis quernea (Schw.) n. comb.

Syn. *Peziza quernea* Schw. Syn. Fung. Carol. Sup. no. 1265 in Schr. Nat. Ges. Leipzig **1**: 124, 1822.[2]

Cenangium turgidum Fries in Syst. Myc. **2**: 186, 1822. (Not *C. turgidum* Duby, 1830.)

Cenangium turgidum Schw. Syn. Fung. Amer. Bor. no. 1995 in Trans. Amer. Phil. Soc. (Philadelphia) II, **4**: 238, 1832.

Patellaria cenangiicola Ellis & Ev. Jour. Myc. **4**: 56, 1888.

Patellea cenangicola Ellis & Ev. sec. Sacc. in Syll. Fung. **8**: 784, 1889.

Cenangium querneum (Schw.) Seym. sec. Thaxter in Mycologia **14**: 101, 1922.[3]

Apothecia separate but closely crowded, seated upon a scurfy, black, pseudoparenchymatous to prosenchymatous stromatoid layer covering well-defined hypertrophied areas up to 1 cm. in diameter, larger by confluence, sessile, at first subglobose, cupulate to subapplanate when expanded, up to 1 mm. in diameter; exciple chestnut-brown to blackish, subrugose, corky-leathery to subcarbonous when dry, somewhat fleshy-leathery when moist, concentrically sulcate with ridges connivent at the mouth, later with tips of ridges persisting as claw-like projections incurved from the margin; hymenium even, brown; asci clavate to cylindrical-clavate, 77–150 × 13–16 μ, usually about 90 × 15 μ, opening by a pore, iodine-, with 8 spores irregularly biseriate; spores simple (rarely becoming pseudoseptate), hyaline, subfusiform to fusiform, at first asymmetrical and slightly larger at

[2] Although there has been some doubt in regard to the exact date of this publication in its relation to that of Fries' Systema, the evidence presented by Shear and Stevens (Mycologia **9**: 197, 1917) is rather conclusive as to the appearance of the Schweinitz publication early in 1822 but not previously, since Schweinitz was first apprized of it on receipt of reprints late in 1822. The citation in Fries' Systema, Volume 2, of many Schweinitzian names as synonyms suggests the priority of the Schweinitz publication.

[3] This citation refers to No. 106 of Reliquiae Farlowianae labeled *Cenangium turgidum* (Schw.) Fries, which is not that species but is *Excipula* (sub *Cenangium*) *turgida* Fries, Syst. Myc. **2**: 189 = *Cenangium turgidum* (Fries) Duby = *Catinula turgida* (Fries) Desm.

one end, 30–47 × 6–10 μ, becoming narrower and more symmetrical at maturity; paraphyses filiform and hyaline at the base, septate, simple to branching toward the apices, apex light

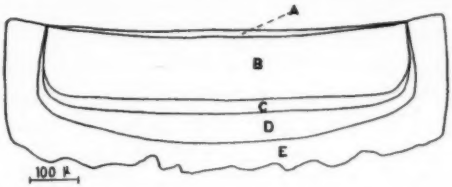

FIG. 1. Diagram of vertical section through an apothecium to show tissue relations. A. Epithecium; B. Hymenium; C. Hypothecium; D. Medullary layer of exciple; E. Ectal layer of exciple.

to dark chestnut-brown, inflated, subclavate, reaching a diameter of 3–5.5 μ, gelatinizing to form an epithecium; hypothecium in vertical section subhyaline to brownish, as a loose prosenchyma about 30 μ thick; exciple about 90–150 μ thick, in two layers: (1) medullary layer a definite, subhyaline to light brown pseudo-

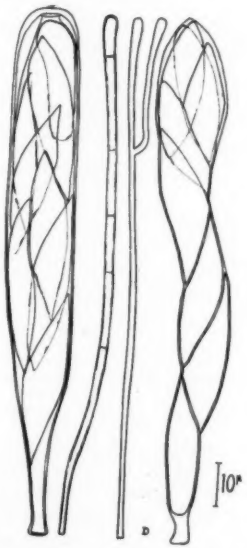

FIG. 2. Asci and paraphyses. (For the branched paraphysis and the ascus on the right the protoplasmic membrane was not clearly defined.)

parenchyma of polygonal cells 3–5 μ in diameter, in mass appearing as a palisade separated from the hypothecium by a border of darker cells; (2) ectal layer of tissue similar to the medullary layer, but denser and more opaque in section with outer border irregularly lacerate.

On small twigs of various species of *Quercus* in the Eastern United States.

SPECIMENS EXAMINED

On *Quercus* sp., either Salem, N. C., or Bethlehem, Pa.[4], as *Cenangium turgidum* in Herb. Schweinitz and in Herb. Michener.—Specimens not in good condition but showing the characteristic incurved projections of the exciple.

On *Quercus* sp., Missouri, comm. Winter, as *Cenangium turgidum* in Herb. N. Y. Bot. Gard.

On *Q. alba*, Newfield, N. J., Dec., 1879, with specimen of *Dichaena* in Ellis & Ev. N. Am. Fungi *793*, in Herb. N. Y. Bot. Gard.

On *Q. coccinea*, Alabama, coll. Peters, as *Cenangium turgidum* in Rav. Car. **4**: 24.

On *Q. coccinea*, Newfield, N. J., Apr., 1888, as *Cenangium turgidum* in Ellis & Ev. N. Am. Fungi *2148*.

On *Q. coccinea*, Newfield, N. J., Apr. 30, 1888, type of *Patellaria cenangiicola* Ellis & Ev., in Herb. N. Y. Bot. Gard.

On *Q. marilandica*, Lakoochee, Fla., 1900–1902, L. H. McCullough.

On *Q. tinctoria*, Newfield, N. J., Apr., 1874, J. B. Ellis, as *Cenangium turgidum* in Herb. N. Y. Bot. Gard.

On *Q. virginiana*, Dunedin, Fla., Apr. 20, 1900, S. M. Tracy 6619, as *Dichaena* in U. S. Nat. Herb. and in Herb. N. Y. Bot. Gard.—No spores found.

Except where otherwise noted these specimens are in the Mycological Collections, B. P. I. Several specimens labeled

[4] Both the Schweinitz specimens cited are mere fragments although the Michener Herbarium specimen is labeled merely "Bethlehem." If the Philadelphia specimen is not a duplicate it may then be considered as from Salem, in which case it would be looked upon as the type. It is, of course, possible that Schweinitz sent the original material to Fries or to others as was his custom.

Dichaena appear to be *Godroniopsis*, at least in part, but are in too poor condition for positive determination.

Of the specimens cited the one from Lakoochee, Florida, shows the most robust development and is more indicative of a normal condition than is the type specimen. The ectal ridges of the exciple are persistent in unopened or open disks, both of which, when viewed from above, present a stellate appearance with these ectal ridges as stellar apices on the periphery. In widely opened disks these ridge-tips persist as horn-like or claw-like projections, often incurved from the margin of the apothecium (see plate). The general aspect of the fungus closely resembles that of *Dichaena quercina* (Pers.) Fries except for a rougher appearance and its occurrence only upon conspicuous swollen areas of the twigs. These somewhat pulvinate or effuse swollen areas are hypertrophies limited to the cork layer of the bark and composed of cork cells with hyphal elements. Although nothing is known of the exact relationship between the fungus and these hypertrophies, they are associated in all the specimens examined.

Examination of type material of *Patellaria cenangiicola* Ellis & Ev., described as occurring on *Cenangium turgidum*, failed to show any fungus except the latter. While most of these apothecia are identical with typical opened disks of *Godroniopsis*, with characteristic points of the excipular ridges conspicuous on the margin, a few are present in which the exciple has practically disappeared, leaving mere fragments on the lower surface. *Patellaria cenangiicola* was apparently described from material in this latter condition. No spores were found to be definitely septate as noted in the description, although protoplasmic separation occasionally produced a pseudoseptate appearance. In all other characters, the type material of the *Patellaria* agrees completely with specimens of *Godroniopsis quernea*.

Thanks are due to Drs. C. W. Dodge, F. W. Pennell, and F. J. Seaver for the privilege of examining certain specimens.

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EXPLANATION OF PLATE 21

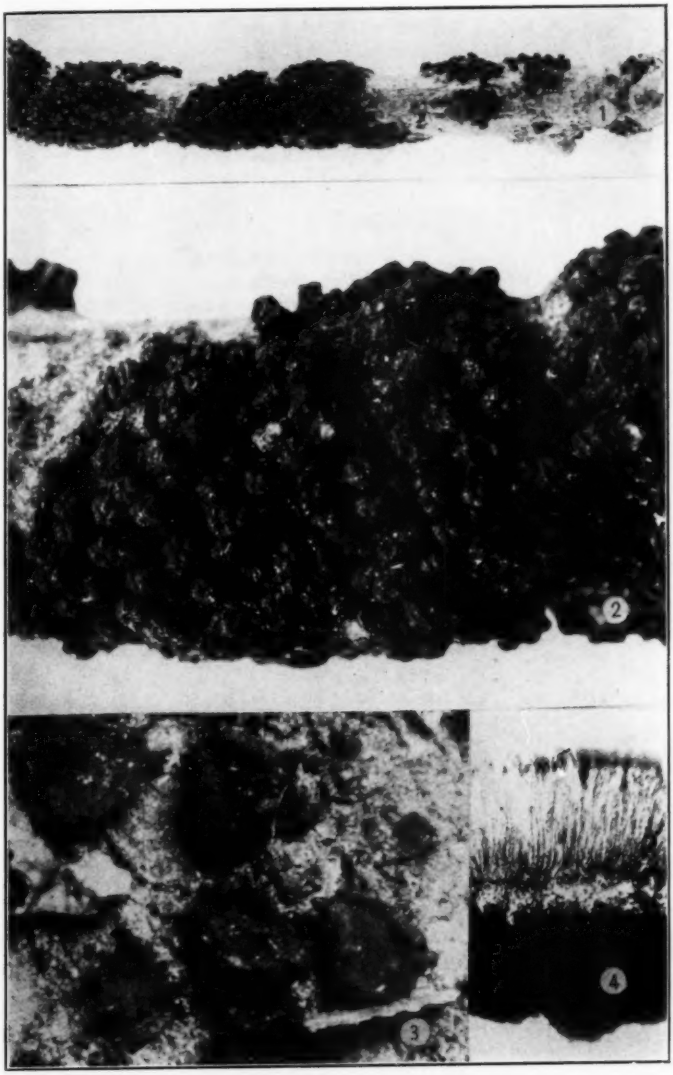
Fig. 1. Florida specimen (L. H. McCullough), × 2.2, showing habit.

Fig. 2. Detail of Fig. 1, × 10, showing closed apothecia.

Fig. 3. S. Car. specimen (Ravenel Fungi Car. **4**: no. *24*), × 25, showing open apothecia.

Fig. 4. S. Car. specimen (Ravenel Fungi Car. **4**: no. *24*), photomicrograph of vertical section through apothecium, × 143.

Photographic negatives for Figs. 1, 2, and 4 by M. L. S. Foubert, for Fig. 3 by J. F. Brewer.



GODRONIOPSIS QUERNEA

THE YELLOW SPECIES OF ACAROSPORA IN NORTH AMERICA

(DESCRIPTIONS OF NEW SPECIES AND KEY)

BY A. H. MAGNUSSON

KEY TO THE YELLOW SPECIES KNOWN FROM NORTH AMERICA

1*a*. Thallus with more or less distinct marginal lobes.
  2*a*. Apothecia 0.1–0.3 mm. broad.
    3*a*. Hymenium about 100 μ high, cortex 15–25 μ thick ..... *A. extenuata.*
    3*b*. Hymenium about 65–70 μ high, cortex 35–50 μ .... *A. texana.*
  2*b*. Apothecia usually above 0.5 mm. broad.
    4*a*. Apothecia prominent, usually convex with disappearing margin, hymenium about 50 μ high ..... *A. chlorophana.*[1]
    4*b*. Apothecia in thallus—level with persistent margin, plane, hymenium 60–90 μ high ..... *A. oxytona.*
1*b*. Thallus areolate or squamulose.
  5*a*. Apothecia dilatate, 0.5 mm. broad or larger.
    6*a*. Growing on earth, apothecia reddish brown, spores globose ..... *A. Schleicheri.*
    6*b*. Growing on stone, spores ellipsoid.
      7*a*. Hymenium below 120 μ high, apothecia immersed, brownish red, cortex about 50 μ.
        8*a*. Areolae more or less dark citrine, contiguous, apothecial margin prominent .... *A. socialis.*
        8*b*. Areolae pale citrine or whitish, dispersed, apothecial margin not prominent ..... *A. subalbida.*
      7*b*. Hymenium 120–135 μ high, medulla filled with granules, apothecia 1–1.5 mm., prominent ..... *A. evoluta.*
  5*b*. Apothecia punctiform or rarely surpassing 0.5 mm.
    9*a*. Hymenium above 120 μ high.
      10*a*. Lower side blackish, squamules 2–7 mm. broad.
        11*a*. Cortical lumina distinct, 3–4 μ, medullary hyphae leptodermatous, apothecia several, pale; spores 4–6 × 2.5–3 μ ..... *A. Brouardi.*
        11*b*. Cortical lumina indistinct, medullary hyphae pachydermatous, apothecia poorly developed, spores narrow ..... *A. xanthophana.*
      10*b*. Lower side pale, cortical lumina 2–2.5 μ, apothecia punctiform, pale ..... *A. Amabilis.*

[1] Not yet recorded from North America.

9*b*. Hymenium below 120 μ.
12*a*. Spores broadly ellipsoid or subglobose, 2–3 μ broad.
13*a*. Apothecia inconspicuous, pale; squamules dispersed, hymenium 75–85 μ, cortical lumina 1.5–2 μ. ..... *A. samcënsis.*
13*b*. Apothecia 0.2–0.5 mm., blackish brown, several; areolae contiguous; hymenium 85–100 μ, cortical lumina 3–6 μ. ..... *A. bella.*
12*b*. Spores narrowly ellipsoid, 1.5–2 μ broad.
14*a*. Cortex 55–75 μ thick, apothecia 0.4–0.6 mm., brownish red, areolae whitish, paraphyses firmly coherent ..... *A. subalbida.*
14*b*. Cortex below 50 μ thick, apothecia blackish.
15*a*. Apothecia punctiform, thallus continuous, smooth, more or less vitelline, areolae not gomphate ..... *A. contigua.*
15*b*. Apothecia dilatate, areolae more or less gomphate, their center often whitish, lower side dark brown ..... *A. chrysops.*

DESCRIPTIONS OF NEW SPECIES

1. **Acarospora texana** H. Magn. n. sp.

Thallus intense flavus, determinatus, ambitu plus minusve distinctus radiatus vel lobulato-crenatus, centroversus areolatus, arcte adnatus, subtus pallidus. Apothecia sparsa, solitaria, primum punctiformia, deinde plus minusve dilatata, minuta, discus concavus fuscocarneus. Hymenium angustum. Sporae tenuiter ellipsoideae.

Thallus (in the small specimen seen) forming areas 0.5–1 cm. in diameter, as a rule distinctly limited, pale yellow, the marginal areolae 1 mm. long, more or less distinctly lobate, 0.5–0.75 mm. broad, plane or slightly convex, opaque, smooth, about 0.2 mm. thick, the central areolae contiguous, angulose, separated by thin cracks, 0.3–0.4 mm. thick, the fertile ones more or less slightly verrucose, all unaltered by KOH and $CaCl_2O_2$, largely affixed, the lower surface pale.

Cortex 35–50 μ thick, in water yellowish gray, not transparent, in KOH colorless with an outer amorphous stratum, 20–25 μ, and an inner stratum, darker in the upper half, with perpendicular, indistinct hyphae and poorly visible lumina, about 1 μ in diameter. Gonidia 7–12 μ thick, forming an unbroken stratum 50 μ thick, with an even upper surface and somewhat distinct lower limit. Medulla 100–300 μ thick, in water dirty gray, opaque on account of innumerable very small granules covering

the hyphae and dissolving in HCl. Then the hyphae appear to be arachnoidly intricate, 3.5–4.5 μ thick, very pachydermatous, with uneven, seemingly rough surface and very thin, more or less filiform lumina. Lower cortex partly well developed, resembling the upper one.

Apothecia present only in the central areolae but not numerous, at first punctiform, always impressed, disc round, 0.1–0.25 mm. broad, pale yellowish brown, concave, smooth. Exciple distinct, 8–12 μ, colorless, not fanlike at the surface. Hypothecium 20–30 μ, densely intricate. Hymenium 65–70 μ, like the hypothecium colored dark blue with iodine, lower half colorless, upper 25–35 μ dark yellow with uneven surface or dirty brownish red. Paraphyses coherent, not discrete in water, somewhat free in KOH, 1.7–2 μ thick, not capitate, midmost joints scarcely visible, 5–7 μ. Asci 40–50 × 16–19 μ, swollen clavate or pyriform. Spores about one hundred, 3–4.5 × 1.5–1.8 μ, ellipsoid.

Pycnidia not observed.

On granitic, quartz-resembling stone.

U. S. A. Texas; "in mont. Texanis, *E. T*[*uckerman*]" sub *Parmelia chlorophana*, type (in Botanical Garden, Uppsala) perhaps belonging to Wright's collection cited in Tuckerman, Syn. N. Am. Lich. 1: 201. 1882.[2]

A. texana looks like a young specimen of *A. chlorophana* or *A. oxytona* but it is distinctly separated by the constantly immersed, very small apothecia. It resembles *A. oxytona* in having an opaque medulla but is separated by a narrower exciple and cortex. From the European *A. hilaris* (Duf.) Hue, which it resembles in habit, it is distinguished by the very indistinct cortical lumina and the smaller spores.

2. **Acarospora extenuata** H. Magn. n. sp.

Thallus determinatus, pallide virescenti-citrinus, tenuis, centro areolatus, ambitu plus minusve distincte lobatus, lobuli substrato arcte adpressi, plani, rimis tenuibus separati, subtus pallidi. Apothecia pauca, minutissima, punctiformia, singula vel raro duo triave in quavis areola, discus leviter impressus, fuscus. Cortex tenuis. Hymenium angustum. Sporae tenuiter ellipsoideae.

[2] A careful comparison of a single collection of *Parmelia chlorophana* from Texas in Tuckerman's Herb. labeled "Organ Mountains, Texas, Wright 1852" with the above description leaves no doubt that the specimen belongs to *A. texana* and is probably a portion of the type collection.—C. W. Dodge.

Thallus more or less distinctly determinate, forming more or less continuous areas up to at least 3 cm. broad, pale greenish citrine, marginal lobes 1–2 mm. long, 0.5–1 mm. broad, widened at the apices, toward the circumference very thin, smooth, plane, separated by very narrow cracks, the center areolate with partly loosening areolae, these 0.5–1 mm. broad, 0.3–0.4 mm. thick, of different shape, separated by thin cracks, plane or slightly convex, smooth, unaltered by KOH and $CaCl_2O_2$, widely fastened to the stone with the pale lower surface.

Cortex very thin, 15–25 μ, in water, KOH and HCl pale yellowish brown, opaque, in $CaCl_2O_2$ pale dirty yellow with indistinct lumina 1.5–2.5 μ in diameter. Gonidia 10–14 μ in a stratum 50–100 μ thick, continuous also below hymenium, surface rather even. Medulla 100–200 μ thick, transparent or dirty yellowish, obscured by particles from the substratum, not dissolving in HCl. Hyphae mainly perpendicular or more or less intricate, 2–3 μ thick, leptodermatous, closely woven. The pale marginal cortex sometimes extending far in under the areolae and resembling the upper one, but the areolae widely affixed.

Apothecia not numerous, solitary or rarely two or three in each areola, immersed, disc punctiform, 0.1–0.2 mm. broad, more or less brownish or yellowish brown, scarcely visible. No distinct exciple. Hypothecium thin, 25–35 μ, grumose. Hymenium 100–115 μ high, colorless, in iodine red, upper 25–35 μ dark dirty yellow, surface very uneven, often with a yellowish amorphous stratum up to 35 μ thick. Paraphyses in water fairly discrete, 1.8–2 μ, slightly swollen at the apices. Asci 80–90 $\times$ 25 μ, swollen clavate. Spores at least 200, (3.5–)4–5.5 $\times$ 1.7–1.9 μ, mostly narrowly ellipsoid.

Pycnidia not found.

On granitic rocks.

Mexico, vicinity of Mexico City, *Frère Amable 604*, type (in herb. B. de Lesdain).

A. extenuata seems to be nearly related to *A. hilaris* (Duf.) Hue but has a thinner cortex with indistinct lumina, the hymenium is higher and the asci swollen.

3. **Acarospora socialis** H. Magn. n. sp.

Thallus indeterminatus areolatus, saturate vel virescenti-flavus, areolae minutae, dispersae vel plus minusve contiguae, irregulares, convexae, subtus obscurae. Apothecia maculatim congregata, in quavis areola saepius solitaria, discus sensim

dilatatus, ad 1 mm. latus, obscure rufus, planus. Cortex superior crassus luminibus distinctis. Hymenium subangustum. Sporae tenuiter ellipsoideae.

Thallus indeterminate, covering areas up to at least 4 cm. (or probably much larger), of a bright or greenish yellow color, areolate, unaltered by KOH and $CaCl_2O_2$. Areolae approaching one another or ± contiguous with narrow cracks, usually angular or irregular, occasionally even sublobate, of unequal size, 0.3–1(–1.5) mm. broad, 0.3–0.5(–0.8) mm. thick, smooth, convex, with appressed or rarely rising margins, distinctly gomphate with the lower side usually dark brown.

Cortex 40–70(–85) μ thick, near the margins only 35 μ, uppermost 20–35 μ greenish yellow, somewhat transparent, reticulate, amorphous stratum up to 5 μ. In water lumina distinct, also in the colored part, more or less round and leptodermatous, 2.5–3.5 μ in diameter, in HCl very distinct. Gonidia 7–14 μ, in a dense continuous stratum, 200 μ thick (100 μ below the hymenium) with even upper surface. Medulla usually transparent, mostly less than 300 μ thick. Hyphae somewhat loosely intricate or partly contiguous, distinctly leptodermatous, lumina more or less cylindric, 6–7 × 2 μ or globose, 2–4 μ in diameter. Upper cortex gradually passing into the lower one, which is of the same texture and thickness or thinner, but the exterior 12–17 μ dark brown far in under the areola, or partly pale.

Apothecia in some parts of the thallus crowded, in others absent, one, or occasionally 2–4, in each areola, at first punctiform, soon dilated, immersed, disc dark brownish red, round or somewhat irregular, (0.3–)0.5–1(–1.5) mm. broad, smooth and plane, surrounded by the prominent margin of the areola. Exciple very distinct, below 15–35 μ thick, at the surface 50–110 μ, in iodine not colored or pale blue, with very distinct leptodermatous lumina, below globose, 2–3 μ, towards the surface elongate, 3–5 × 2–3 μ, surface dark greenish yellow. Hypothecium varying, 30–120 μ, yellowish, in iodine dark blue. Hymenium 90–120 μ, colorless, in iodine bluish or dark dirty green, uppermost 10–17 μ reddish brown in water. Paraphyses in water coherent, more or less discernible, 1.7–2(–2.5) μ thick, the apices in KOH coherent, not or only slightly capitate, 3 μ, brownish yellow. Asci numerous, 60–85 × 14–17 μ, elongate. Spores 100–200, 4–5.5 × 1.8 μ, narrowly ellipsoid.

Pycnidia numerous, one or several in the sterile areolae, visible as small blackish dots, slightly prominent above the thallus surface, about 0.1–0.2 mm. broad, globose, with sometimes infolded wall. Sterigmata 8–10 μ, conidia 2–2.5 × 0.6–0.9 μ, ellipsoid.

On granitic stone, in most specimens associated with species of *Caloplaca* and *Lecanora* (cf. *L. saxicola*), thus indicating a habitat rich in nitrogen.

U. S. A. California: Fresno County, Kings River, *G. Eisen* (in Botanical Garden at Uppsala); Santa Cruz County, Santa Cruz Mountains, foothills 1½ miles from Mayfield, *Herre*, 1904 (Nat. Hist. Mus. Wien); Los Angeles County, Santa Catalina Island, on mountain tops, *L. W. Nuttall 478*, type (in Merrill Herb. at Farlow Herb.); San Diego County, San Diego, *Clara Cummings*, 1896, in Cummings, Williams and Seymour, Decades of North American Lichens *215*, under *Lecanora xanthophana* (in British Museum).

MEXICO: Querétaro at 1850 m., *Arsène Brouard*, 1914 (in Herb. B. de Lesdain).

CHILE: Santiago, Serro de Ranca, P. Dusén, 1896 (in Herb. G. O. Malme).

A. socialis belongs to the small group with large apothecia and comes near *A. evoluta*. As to the differences between these two species, see below. In one specimen I have found a chalky white medulla with a non-granular material not dissolving in HCl but in KOH.

4. **Acarospora evoluta** H. Magn. n. sp.

Thallus areolatus, virescenti-luteus vel obscure citrinus, areolae contiguae, crassae, inaequales, saepe sublobatae, margine libero, subtus pallidae. Apothecia sparsa, magna, thallum paullo superantia, discus planus, rotundus, carneo-fuscescens, scabridus. Cortex crassus, distincte cellulosus. Hymenium altum. Sporae tenuiter ellipsoideae.

Thallus somewhat dark greenish yellow, probably indeterminate (margin not observed), areolae squamuliform, contiguous, confluent, 1–3 mm. broad, 0.7–1.5 mm. thick, opaque, on the whole plane or slightly convex though very uneven and ± verruculose from numerous pycnidia, unaltered by KOH and $CaCl_2O_2$, the margins often free, especially in the ± panniform areolae. Lower side pale, areolae usually distinctly gomphate.

Cortex very uneven in thickness, in one specimen 35–50 μ, in another 70–90 or even 170 μ, upper third or two fifths dark yellow, hardly transparent, lower part white with netlike arranged, very distinct lumina, 3–4 μ, ± round, no distinct amorphous stratum. Gonidia 8–12 μ, in a very irregular stratum,

50–200 μ thick, interrupted by pycnidia or hyphal strands, sometimes in vertically stretched, ± rectangular lumps. Medulla dirty white, obscured by innumerable white granules, dissolving in KOH, hyphae then arachnoid, irregularly swollen, 3–4 μ thick, ± pachydermatous.

Apothecia scanty, in or among the areolae, slightly rising above thallus level, disc 1–1.4 mm. broad, plane, rough from yellow remains of the cortex, pale reddish brown or yellowish brown with a distinct, prominent margin.

Exciple distinct, about 20 μ thick, at the surface 80–100 μ. Hypothecium 50–70 μ. Hymenium (110–)120–135 μ, colorless, in iodine pale or greenish blue, uppermost 25–30 μ dark yellow. Paraphyses very discrete, 1.6–1.8 μ, leptodermatous, not distinctly capitate but uppermost joints short, ellipsoid, 2–2.5 μ. Asci 90–100 × 16–17 μ, clavate. Spores 100–200, 5–6 × 1.8–2 μ, narrowly ellipsoid.

Pycnidia sometimes numerous, immersed, with pale mouth, reaching 200 μ in depth and 150–180 μ in breadth with very irregular, infolded and pale wall. Sterigmata about 10 μ, conidia 2–2.5 × 0.8–1 μ, narrowly ellipsoid.

On granitic or volcanic rocks, with traces of a *Caloplaca*-species.

U. S. A. California: Santa Barbara, Cooper's Canon, *W. G. Farlow* (Journey to Calif. 1885) (Nat. Hist. Mus. Wien and Farlow Herb.); Santa Cruz Mts., Mayfield, *Kingman*, 1916 (in hb. C. C. Plitt), type.

A. evoluta is distinguished from the other yellowish species especially by the large apothecia with a distinct margin and the thick, uneven areolae. It may be compared with *A. socialis*, which also has large apothecia, but this one has thinner, smooth areolae dark below, blackish mouth of the pycnidia, and a low hymenium with coherent paraphyses.

5. **Acarospora Amabilis** H. Magn. n. sp.

Thallus indeterminatus, areolatus, areolae citrinae, saepius contiguae, minutae, subplanae, subtus pallidae. Apothecia rara, immersa, punctiformia, discus thallo concolor, rotundus vel elongatus. Cortex superior crassus, distincte cellulosus. Hymenium altum. Sporae tenuiter ellipsoideae.

Thallus indeterminate, areolate, citrine-yellow, areolae 0.6–1 mm. large, 0.3–0.4 mm. thick, usually contiguous and separated by distinct cracks, or towards the circumference dispersed, angulose, single areolae even sublobate, mostly plane or slightly

uneven, unaltered by KOH and $CaCl_2O_2$, somewhat widely affixed with pale lower surface.

Cortex 40–60(–85) μ thick, upper half dark yellow, not transparent, lower white, amorphous stratum indistinct. Lumina 2–2.5(–3) μ, rather distinct in water. Surface very uneven, sometimes with small pits. Gonidia 7–13 μ, in a 70–100 μ thick, unbroken stratum. Medulla thin, 50–100 μ, colorless and transparent, often with inspersed gonidia, hyphae intricate, distinctly leptodermatous, 2.5–3.5 μ thick with short $\pm$ round or irregular lumina. Lower side pale, rarely with a dark yellow cortex, only 5–10 μ thick.

Apothecia not numerous, immersed, inconspicuous, single or often several in each areola, disc punctiform or more or less elongated and irregular, 0.1–0.2(–0.3) mm. broad, concolorous with the thallus. Exciple indistinct. Hypothecium about 50 μ high, more or less conical, in iodine blue. Hymenium 135–170 μ high, in iodine pale blue or pale yellowish red, uppermost 20–30 μ in water dark yellow. Paraphyses distinct though coherent, 1.8–2 μ thick, in water with visible filiform lumina, the apices not capitate, also in KOH yellow. Asci 90–100 $\times$ 15–25 μ, clavate, young. Spores 100–200, 5–7.5 $\times$ 1.6–1.9 μ, narrowly ellipsoid or subcylindric.

On lax, grayish yellow, farinose not calciferous stone associated with *Caloplaca*-species.

MEXICO: Tlalpan near the city of Mexico, 1926, *Frère Amable* (comm. B. de Lesdain).

A. Amabilis resembles other yellow species in appearance but is distinguished by the small apothecia with high hymenium and narrow spores, the thick cortex and the leptodermatous medullary hyphae.

In the single specimen seen I noticed that the upper cortex, especially the lower uncolored part of it, assumed a distinct reddish yellow color in iodine. This uncommon feature is perhaps accidental.

6. **Acarospora contigua** H. Magn. n. sp.

Thallus indeterminatus, areolatus, areolae pallide vitellinae, contiguae, minutae, planae arcte et late adnatae. Apothecia numerosa, in quavis areola singula, dua triave, punctiformia, obscura. Lumina corticis distincta, hymenium angustum. Sporae tenuiter ellipsoideae.

Thallus indeterminate, crustose, continuous for at least 2–3

cm., dark almost vitelline yellow, on the whole smooth, areolae 0.3–0.5(–1) mm. broad, towards the circumference very thin, in the center thicker, 0.3(–0.4) mm. and sometimes loosening, irregularly angulose, separated by very thin cracks, plane, smooth, fastened to the stone with the whole lower surface.

Cortex 35–50 μ, upper half or two thirds dark greenish yellow, opaque, lower part transparent, amorphous stratum indistinct. Lumina distinct in water, especially in the lower part, 2.5–3.5(–4) μ broad, angulose, leptodermatous. Gonidia 8–14 μ, stratum very lax, with indistinct upper and lower limit, 50–80 μ thick, with dense traversing hyphae or groups of hyphae. The medullary stratum not distinctly limited, consisting of loosely intricate, thread-like, 2–3 μ thick hyphae and $\pm$ cellulose parts with round, 2.5–4 μ broad, leptodermatous lumina, the whole with numerous particles from the substratum. No lower cortex.

Apothecia numerous, especially towards the center, immersed, punctiform, solitary or occasionally 2–3 in each areola, disc 0.1–0.2(–0.3) mm., blackish, on a level with the thalline surface or slightly immersed.

Exciple below more or less distinct, 6–12 μ thick, yellowish. Hypothecium 50–70 μ, shallowly cup-like, grumose, in iodine dark blue. Hymenium 90–100 μ, in iodine dirty reddish, uppermost 16–20 μ $\pm$ dark yellow. Paraphyses rather discrete, 1.7 μ thick, in HCl after pressure quite free or the apices conglutinate, not capitate but slightly swollen, 2.5–3 μ in KOH. Asci 60–65 $\times$ 17–19 μ, broadly clavate. Spores 100–200, 4–5 $\times$ 1.6–1.9 μ, ellipsoid.

On a somewhat calciferous sandstone-like rock.

U. S. A. Texas (no locality given), *I. Boll* (Nat. Hist. Mus. Wien, Stockholm and Farlow Herb.), associated with *A. chrysops* Tuck Lesd. It was called *xanthophana* by Müller Argau.

A. contigua is distinguished by the dark yellow color, the continuous smooth crust, the non-gomphate areolae with blackish apothecia and the distinct lumina in the cortex and the medulla.

7. **Acarospora subalbida** H. Magn. n. sp.

Lecanora xanthophana Tuck. Syn. N. Am. Lichens **1**: 202. 1882, p.p.

Thallus squamulosus, indeterminatus, squamulae dispersae vel subcontiguae, albidae, humectatae pallide citrinae, rotundae, leviter convexae, subtus pallidae. Apothecia plerumque singula, immersa, discus dilatatus planus, fusco-rufus, margine thallino prominente circumdatus. Hymenium angustum. Sporae tenuiter ellipsoideae.

Areolae dispersed or few crowded, 0.5–1 mm. broad, 0.3–0.4 mm. thick, white or with a tinge of citrine, when moistened distinctly pale citrine, smooth, slightly convex or subplane, usually round, unaltered by KOH and $CaCl_2O_2$, largely fastened to the stone with the lower pale surface.

Cortex 55–75 μ thick, upper half pale grayish yellow, not transparent, surface granular, rough, amorphous stratum indistinct but in reality consisting of the uppermost 25–35 μ, where the lumina are of a different shape. Lumina in lower part indistinct in water, in HCl somewhat distinct, 2.5–3.5 μ, irregularly angulose, leptodermatous. Gonidia 7–12 μ, almost dark yellow, stratum about 70 μ high with even upper surface, from which single very narrow strands of hyphae pass through it without sectioning the stratum. Medulla regularly developed, transparent, hyphae loosely woven, intricate, very leptodermatous, 3–4 μ, lumina rectangular. Marginal cortex pale, sometimes visible under the brim of the lower side.

Apothecia numerous, solitary or rarely two in each areola, immersed, disc 0.4–0.6(–0.7) mm. broad, plane, brownish red, round or the larger ones irregular, surrounded by the thick prominent margin of the areolae.

Exciple 15–20 μ, distinct especially at the bottom, in the margin indistinct. Hypothecium 50–70 μ, shallowly cup-like, in iodine blue. Hymenium 100–120 μ high, in iodine at first blue, soon dirty greenish or dirty vinous, uppermost 20–25 μ in water reddish brown. Paraphyses firmly coherent in rich gelatine, 1.7–2 μ thick, in water indistinctly brownish capitate, in KOH also coherent with scarcely swollen apices, 2.5 μ thick, brownish. Asci 80–95 $\times$ 20–25 μ, broadly clavate. Spores 100–200, 4–5 $\times$ 1.8–2 μ, somewhat narrowly ellipsoid.

Pycnidia not observed.

On pale calciferous sandstone, associated with *Caloplaca* conf. *ferruginea*.

U. S. A. California: Santa Monica Mts., "Topanga Canon," *H. E. Hasse*, 1909 (ex herb. Hasse in herb. B. de Lesdain) type; Texas: "in montibus Texanis coll. Wright, comm. *E. Tuck*." (in Botanical Garden Uppsala).

Though quite chalky-white this species certainly belongs to the yellow series on account of the yellowish color in the cortex concealed by the thick amorphous stratum. The leptodermatous medullary hyphae and the firmly coherent paraphyses are also noticeable characteristics in addition to the large beautifully brown red disc when fully developed. In the specimen from

Texas the medulla is filled with masses of granules, perhaps due to a richer content of chalk in the substratum, and the apothecia are young, only 0.1–0.2 mm. in diam.

The real *A. xanthophana* from Bolivia has 2–5 mm. broad and 1–1.5 mm. thick areolae with a blackish lower side, numerous pycnidia and pachydermatous medullary hyphae.

8. **Acarospora samoënsis** H. Magn. n. sp.

Thallus indeterminatus, squamulosus, squamulae obscure citrinae vel virescente citrinae, dispersae, planae vel irregulariter convexae, gompho centrali affixae, subtus pallidae. Apothecia inconspicua, punctiformia, in squamulis singula vel pauca, immersa, disco thallo concolore. Hymenium angustum. Sporae subglobosae.

Squamulae equally dispersed above the stone with small interspaces or rarely a few contiguous, greenish yellow or dark citrine, (0.6–)1(–1.5) mm. broad, at the margin 0.2 mm. thick, at the center 0.5 mm., round or somewhat irregular in shape but not lobate, on the whole plane or slightly verrucose, with uneven surface, unaltered by KOH and $CaCl_2O_2$, fastened to the stone with a ± narrow gomphus, lower side pale.

Cortex 35–55 μ thick, upper two thirds dark dirty greenish yellow, opaque, in KOH only slightly paler, no amorphous stratum. Lumina also in HCl very indistinct, 1.5–2 μ. Gonidia 8–12 μ, in a continuous 50–90 μ thick stratum with even surface. Medulla at the margins about 100 μ thick, above the gomphus up to 500 μ, transparent. Hyphae closely intricate, 3–4.5 μ thick, somewhat conglutinate and rather pachydermatous. Lumina round or elongate or ± cylindric. Lower side towards the margins with a pale or partly yellowish brown cortex, 20–35 μ, the 0.3–0.5 mm. broad gomphus up to 0.6 mm. high.

Apothecia very inconspicuous, impressed, one or 2–3 in the areola, disc punctiform, impressed, concolorous with the thallus.

No distinct exciple. Hypothecium with subhymenium 30–100 μ, in iodine dark blue. Hymenium 75–85 μ high, in iodine dark blue, uppermost 35–40 μ in water dark yellow, opaque, in KOH and HCl unchanged, surface very uneven. Paraphyses in water scarcely discernible, in KOH and HCl 1.5–1.7 μ thick, still coherent, with the apices somewhat widened, 2.5 μ, yellowish brown. Asci not well developed, about 50 × 10–17 μ, clavate. Spores about 100, broadly ellipsoid or subglobose, 3–4(–4.5) × 2–3 μ, with granular content.

Pycnidia immersed, with colorless mouth, ampullaceous, 135 μ

deep, 50–60 μ broad. Sterigmata about 12 μ, conidia 2.5–3 $\times$ 0.7 μ.

On volcanic stone without accompanying species.

HAWAIIAN ISLANDS: Oahu "auf einem ehemaligen Vulkan bei Honolulu: Punch bowl," 1905, *K. & L. Rechinger* (in Nat. Hist. Mus. Wien, determined *A. citrina* by A. Zahlbruckner). A second stone in the specimen was covered with *A. bella*.

A. samoensis is distinguished from the numerous yellow species with low hymenium by the subglobose spores. Other important characteristics are: the dispersed gomphate uneven areolae, the inconspicuous apothecia, the small cortical lumina and the firmly coherent paraphyses.

FYRADALERSGATAN 26,
GÖTEBORG, SWEDEN

MYXOMYCETES OF WESTERN WASHINGTON[1]

H. C. GREENE

The Myxomycetes (slime-fungi), also often called Mycetozoa, or simply slime-moulds, are a group of fungus-like organisms, more or less minute, which successively bear the characteristics of a low type of creeping animal in their primary stages, and of an equally low type of plant in their later stages. The plant-like phase, once arrived at, ultimately gives rise again to the animal-like, which in turn produces the plant-like form again, and so on continuously through this strange, yet simple cycle. These Myxomycetes, which during their vegetative existence resemble giant amoebae, and during their reproductive period resemble the Gasteromycetes, a fungal group, but distinguished from the latter by the total lack of mycelium, have been and are claimed by both zoologists and botanists, but, as Dr. T. H. Macbride suggests, it seems very probable indeed that, strictly speaking, they are neither animals nor plants. That is to say, they form an independent, compact unit of their own.

As stated, there are two chief periods in the life-history of a Myxomycete. There is that period of the usually inconspicuous animal-like or vegetative existence, and that of the relatively conspicuous plant-like or reproductive phase. The latter is that commonly seen in the field.

The reproductive bodies, or sporangia, present great diversity as to habit, size, and appearance. On these diversities, more or less constant in the different species, the classification of the group is based. This classification, unfortunately, presents many vexing problems, and is artificial to a degree. Culture studies which will give us the complete life-histories of the various forms would seem to be necessary, if we are to comprehend with any exactness their true relationships.

The coastal belt of Washington from the summit of the

[1] This investigation was carried on in the Botany Department of the University of Washington, Seattle, under the direction of Dr. J. W. Hotson.

Cascade Range to the sea is a region especially favorable for the development of Myxomycetes. Since for their active existence they require a combination of decaying vegetable matter and considerable moisture, with accompanying moderate temperatures, in spring, in early summer, and in late fall, the lowlands of western Washington offer an abundance of these forms. At high altitudes late summer is the favorable season for collection, and, as is also the case with the higher forms of life, many unusual and interesting specimens are to be found near timberline.

It is interesting to note that, in a small woodland area on the campus of the University of Washington, the writer has been able to collect some 53 species in 21 genera. If it were practical to collect as intensively over the whole of western Washington there seems no room for doubt that the list of species following could be tremendously augmented. In the course of about one year, from November of 1927 to October of 1928, a list of 141 forms of Myxomycetes, distributed in 34 genera and including 6 varieties, which occur in western Washington has been assembled.

Some unusual forms have been collected, notably *Physarum rubiginosum* Fries, *Didymium Clavus* Rabenh., *Diderma deplanatum* Fries, *Lepidoderma Chailletii* Rost., *Liceopsis lobata* Torr., *Cribraria languescens* Rex, *Lachnobolus globosus* Rost., and *Trichia alpina* Meylan. *D. deplanatum*, *L. Chaillettii*, *L. lobata*, and *T. alpina*, apparently have not hitherto been reported from North America.

LIST OF GENERA AND SPECIES

CERATIOMYXA Schroet.

1. C. FRUTICULOSA (Muell.) Macbr.

   Common everywhere in spring and early summer in moist situations on logs.

2. C. PORIOIDES (Alb. & Schw.) Schroet.

   Collected once only at North Beach, Seattle, on rotten wood, in early spring.

   A doubtful form at best. Lister accords it varietal rank only.

FULIGO (Haller) Pers.

3. F. SEPTICA (Linn.) Gmelin.

Two of the varieties of this species which Macbride recognizes have been collected, namely *ovata*, common everywhere in spring and summer in exposed situations, and *laevis*, collected once only in late summer in Mt. Baker National Forest, at 2,000 feet, on logs.

BADHAMIA (Berk.) Rost.

4. B. PANICEA (Fries) Rost.

Vicinity of Seattle. In spring, on fir bark.

5. B. UTRICULARIS (Bull.) Berk.

Vicinity of Seattle, Renton. In spring, on fir and alder bark.

6. B. RUBIGINOSA (Chev.) Rost.

Vicinity of Seattle. Collected by Mr. John Jackal.

PHYSARUM (Pers.) Rost.

7. P. VERNUM Somm.

Quilcene. In fall, on herbaceous stalks.

8. P. SINUOSUM (Bull.) Weinm.

Seattle, Bremerton, Everett, Mt. Rainier. Spring and summer, on bark, leaves, and moss.

9. P. BITECTUM Lister.

Seattle, Kirkland. Common in fall on bark and leaves.

10. P. ALPINUM G. Lister.

Mt. Rainier. Reported by Macbride.

11. P. CONGLOMERATUM (Fries) Rost.

Mt. Rainier. Collected twice at about 5,000 feet. Late August, on needles, bark, and twigs of alpine fir.

12. P. CONTEXTUM Pers.

Seattle, Bremerton, Seabeck, Mt. Rainier. Fairly common throughout the year on bark, moss, and herbaceous matter.

13. P. CINEREUM (Batsch) Pers.

Vicinity of Seattle. Collected by Mr. John Jackal.

14. P. INSTRATUM Macbr.

Vicinity of Seattle. Collected by Mr. John Jackal.

15. P. CONFERTUM Macbr.

Vicinity of Seattle. Collected by Mr. John Jackal.

16. P. CITRINUM Schum.

Seattle, campus of the University of Washington. Early spring, on bark of living dogwood.

17. P. GLOBULIFERUM (Bull.) Pers.

Vicinity of Seattle. Collected by Mr. John Jackal.

18. P. MURINUM Lister.

Vicinity of Seattle. Collected by Mr. John Jackal.

19. P. PULCHERRIMUM Berk. & Rav.

Vicinity of Seattle. Collected by Mr. John Jackal.

20. P. PULCHRIPES Peck.

Vicinity of Seattle. Collected by Mr. John Jackal.

21. P. PENETRALE Rex.

Renton, Seabeck, Bremerton. Rare in summer, on leaves, sticks, and logs.

22. P. WINGATENSE Macbr.

Vicinity of Seattle. Collected by Mr. John Jackal.

23. P. DIDERMOIDES (Pers.) Rost.

Vicinity of Seattle. Collected by Mr. John Jackal.

24. P. COMPRESSUM Alb. & Schw.

Mt. Rainier. Reported by Macbride.

25. P. CARNEUM G. Lister & Sturgis.

Seattle, Whidby Island. Rare, in fall and early spring on bark and dead wood.

26. P. RUBIGINOSUM Fries.

Bremerton. July, on dead foliage of western red cedar. The writer is indebted to Miss G. Lister for the determination.

27. P. OBLATUM Macbr.

Seattle, Mt. Rainier. Spring and summer, on bark and dead wood.

28. P. TENEREUM Rex.

Common and widely distributed in spring and early summer on decorticate logs and sticks.

29. P. POLYCEPHALUM Schw.

Vicinity of Seattle. Collected by Mr. John Jackal.

30. P. NUTANS Pers.

The most common member of the genus in western Washington. Everywhere in spring and summer on various substrata.

31. P. NUTANS—var. LEUCOPHAEUM List.

Seattle, Seabeck, Bremerton. Spring and summer, fairly common on logs.

32. P. VIRIDE (Bull.) Pers.

Seattle, Seabeck, Bremerton, Willapa Harbor. Spring and summer, on logs.

CRATERIUM Trentepohl.

33. C. AUREUM (Schum.) Rost.

Seabeck, Silverdale, Bremerton. Summer, on leaves, grass, and sticks.

34. C. LEUCOCEPHALUM (Pers.) Ditm.

Bremerton, Everett, Seattle. Summer and fall, on leaves and sticks.

35. C. MINUTUM (Leers) Fries.

Everett. July, on leaves. Macbride states, regarding the sporangial lid, that "It is in all specimens before us much depressed below the mouth of the sporangium," and he further states that the sporangia are grayish brown. The one specimen collected by the writer shows lids which are so convex as to be almost hemispherical, and the sporangia are relatively large and bright red-brown, seeming thus to be of a type common in Europe, but not hitherto reported in the United States.

PHYSARELLA Peck.

36. P. OBLONGA (Berk. & Curt.) Morg.

Vicinity of Seattle. Collected by Mr. John Jackal.

LEOCARPUS (Link) Rost.

37. L. FRAGILIS (Dicks.) Rost.

Seattle, Bremerton, Mt. Rainier. Summer and fall, on bark and sticks.

DIDYMIUM (Schrad.) Fries.

38. D. SQUAMULOSUM (Alb. & Schw.) Fries.

Common in the Puget Sound region in fall and spring, on leaves.

39. D. MELANOSPORUM (Pers.) Macbr.

Bremerton. July, on moss, seemingly rare.

40. D. MELANOSPORUM—var. MINUS Lister.

Seattle, Kirkland, Everett, Longmire Springs. Much commoner than the typical form. Mid-summer.

41. D. CLAVUS (Alb. & Schw.) Rabenh.
Seattle. Mid-summer, on leaves. Collected once only.
42. D. NIGRIPES (Link) Fries.
Seattle, Lake Sammamish, Kirkland, Bremerton. Spring and summer, on leaves.
43. D. XANTHOPUS (Ditm.) Fries.
Seattle, Seabeck, Everett, Port Townsend. Spring and summer, on leaves and herbaceous stalks.
44. D. ANNULATUM Macbr.
Seattle. Reported by Macbride.
45. D. DIFFORME Duby.
Everett. July, on leaves and herbaceous stalks.

DIDERMA Pers.

46. D. SPUMAROIDES Fries.
Seattle, Bremerton. Not common, in summer, on leaves.
47. D. GLOBOSUM Pers.
Silverdale. Early summer, on bark and leaves.
48. D. LYALLII (Mass.) Macbr.
Mt. Rainier. Late August, rare at high altitudes, on dead wood.
49. D. TESTACEUM (Schrad.) Pers.
Kirkland. Late summer, on smooth bark of alder.
50. D. NIVEUM (Rost.) Macbr.
Widely distributed and common in summer, at varying altitudes and on varying substrata.
51. D. DEPLANATUM Fries.
Hood's Canal. Early summer, on leaves and moss.
52. D. HEMISPHERICUM (Bull.) Horne.
Reported by Macbride.
53. D. RADIATUM (Linn.) Morg.
Whidby Island. Early summer, on moss.
54. D. RADIATUM—var. UMBILICATUM Meyl.
Port Townsend, Seattle, Mt. Rainier. Summer and fall, on dead bark. More common than the typical form.
55. D. TREVELYANI (Grev.) Fries.
Vicinity of Seattle. Collected by Mr. John Jackal.

56. D. ASTEROIDES Lister.

Mt. Rainier. Late summer, at 5,000 feet, on the smooth bark of a living cedar.

57. D. FLORIFORME (Bull.) Pers.

Vicinity of Seattle. Collected by Mr. John Jackal.

LEPIDODERMA DeBary.

58. L. TIGRINUM (Schrad.) Rost.

Whidby Island, Seabeck, Bremerton, Mt. Rainier. Summer, on dead wood and moss.

59. L. CHAILLETII Rost.

Mt. Rainier, Mt. Shuksan. Late summer, on stems of living mountain ash. Determined by Miss G. Lister.

60. L. CARESTIANUM—var. GRANULIFERUM Lister.

Mt. Rainier. Late summer, on living mountain ash.

AMAUROCHAETE Rost.

61. A. TUBULINA (Alb. & Schw.) Macbr.

Seattle. Late summer, on smooth, rotten bark.

STEMONITIS (Gled.) Rost.

62. S. FUSCA (Roth.) Rost.

Common and widely distributed in summer on various substrata.

63. S. HYPEROPTA Meyl.

Common throughout the summer, on wet, rotten wood.

64. S. UVIFERA Macbr.

Reported by Macbride.

65. S. SPLENDENS Rost.

Reported by Macbride.

66. S. AXIFERA.

Common and widely distributed in summer, on the smooth bark of logs.

67. S. FLAVOGENITA Jahn.

Seattle, Renton, Mt. Rainier, Mt. Baker National Forest. In summer, on leaves and dead wood.

68. S. PALLIDA Wingate.

Longmire Springs, Mt. Baker National Forest. Late summer, on dead wood.

69. S. HERBATICA Peck.

Reported by Macbride.

COMATRICHA (Preuss) Rost.

70. C. FLACCIDA Lister.
Reported by Macbride.

71. C. IRREGULARIS Rex.
Vicinity of Seattle. Collected by Mr. John Jackal.

72. C. LAXA Rost.
Seattle. Mid-summer, on dead wood.

73. C. SUKSDORFII Ellis & Ev.
Mt. Rainier. Late summer, on dead coniferous wood at 6,000 feet.

74. C. NIGRA (Pers.) Schroet.
Seattle, Bremerton, Whidby Island. Late fall and early spring, on wet, decorticate wood.

75. C. TYPHOIDES (Bull.) Rost.
Abundant and very widely distributed throughout most of the year, on wet, rotten wood.

76. C. ELEGANS (Racib.) List.
Port Townsend. Collected once only in late fall, on fir bark.

DIACHEA Fries.

77. D. LEUCOPODA (Bull.) Rost.
Common and widely distributed in summer, on leaves, in wet, marshy situations.

ENERTHENEMA Bowman.

78. E. PAPILLATUM (Pers.) Rost.
Seattle, Seabeck, Mt. Rainier. Summer and fall, at varying altitudes, on smooth, damp wood.

LAMPRODERMA Rost.

79. L. ROBUSTUM Ellis & Ev.
Reported by Macbride.

80. L. COLUMBINUM (Pers.) Rost.
Port Townsend, Whidby Island, Seabeck, Bremerton, Mt. Rainier. Common on dead wood.

81. L. VIOLACEUM (Fries) Rost.
Mt. Rainier. Late summer, at high altitudes, on the stems of living mountain ash.

82. L. ARCYRIONEMA Rost.
Seabeck. Early summer, on rotten, decorticate log.

LICEA (Schrad.) Rost.

83. L. VARIABILIS Schrad.

Mt. Rainier. Late summer, rare at altitudes of 6,000–7,000 feet, in cracks and crevices of smooth, dry fir wood.

LINDBLADIA Fries.

84. L. EFFUSA (Ehr.) Rost.

Widely distributed and common in late summer, on logs, at varying altitudes from sea level to 6,000 feet.

TUBIFERA Gmel.

85. T. FERRUGINOSA (Batsch) Macbr.

Seabeck, Mt. Baker National Forest Rare in summer on mossy logs.

RETICULARIA (Bull.) Rost.

86. R. LYCOPERDON (Bull.) Rost.

Renton. Early summer, on alder bark.

LICEOPSIS Torr.

87. L. LOBATA Torr.

Whidby Island, Longmire Springs. Specimens taken at Longmire Springs, Rainier National Park, show many free sporangia. As far as can be learned, not hitherto reported from North America. Summer, on bark and dead wood.

ENTERIDIUM Ehr.

88. E. SPLENDENS Morg.

Widely distributed and common in various situations throughout the summer.

89. E. OLIVACEUM.

Mt. Rainier. Late summer, at 7,000 feet, on dead, dry log of alpine fir.

DICTYDIAETHALIUM Rost.

90. D. PLUMBEUM (Schum.) Rost.

Vicinity of Seattle. Collected by Mr. John Jackal.

CRIBRARIA (Pers.) Schrad.

91. C. ARGILLACEA Pers.

Very common and widely distributed in wet situations on coniferous wood, in spring and early summer.

92. C. MACROCARPA Schrad.

Whidby Island, Mt. Baker National Forest. Summer, on rotten coniferous wood.

93. C. MINUTISSIMA Schw.

Longmire Springs. Late summer, on dead coniferous wood at 3,000 feet.

94. C. RUFA (Roth.) Rost.

Common and widely distributed in summer on dead coniferous wood.

95. C. SPLENDENS (Schrad.) Rost.

Macbride states that this species is exceedingly rare, but the writer has collected it at least 30 times, in widely separated areas, in summer, on dead coniferous wood.

96. C. AURANTIACA Schrad.

Seattle, Whidby Island, Seabeck, Bremerton. Summer, on dead coniferous wood.

97. C. DICTYDIOIDES Cooke & Balf.

Seattle, Mt. Baker National Forest. Spring and summer, on dead coniferous wood.

98. C. PIRIFORMIS Schrad.

Common and widely distributed. Late spring and early summer, on dead coniferous wood.

99. C. PIRIFORMIS—var. NOTABILIS Rex.

Seattle, Bremerton, Seabeck, Quilcene, Longmire Springs. Summer, on dead coniferous wood.

100. C. TENELLA Schrad.

Longmire Springs. Late summer, on dead coniferous wood.

101. C. PURPUREA Schrad.

Seattle, Mt. Baker National Forest. Summer, on dead coniferous wood.

102. C. ELEGANS Berk. & Curt.

Longmire Springs. Late summer, on dead coniferous wood.

103. C. LANGUESCENS Rex.

Mt. Baker National Forest. Late summer, on dead coniferous wood.

104. C. CUPREA Morg.

Vicinity of Seattle. Collected by Mr. John Jackal.

DICTYDIUM (Schrad.) Rost.

105. D. CANCELLATUM (Batsch) Macbr.

Common and widely distributed in summer on wet, rotten wood.

LYCOGALA Mich.

106. L. EPIDENDRUM (Buxb.) Fries.

Common and widely distributed in spring and summer on wet logs.

107. L. EPIDENDRUM—var. EXIGUUM Lister.

Bremerton. Late summer, on wet logs.

108. L. FLAVO-FUSCUM (Ehr.) Rost.

Bremerton. Late summer, on old stump.

MARGARITA Lister.

109. M. METALLICA (Berk. & Br.) List.

Reported by Macbride.

DIANEMA Rex.

110. D. CORTICATUM Lister.

Mt. Rainier, Mt. Shuksan. Late summer, at 5,000 feet, on the dead, dry wood of alpine fir.

111. D. ANDERSONII Morg.

Mt. Rainier, Mt. Baker National Forest. Late summer, at 2,000–5,000 feet, on dead coniferous wood and on fir bark.

LACHNOBOLUS Fries.

112. L. GLOBOSUS (Schw.) Rost.

Everett. Late summer, on a fallen alder cone. It is of interest to note the type of substratum chosen, a thing which shows that, while the range of *L. globosus* is not bound up with that of *Castanea dentata*, it nevertheless sought out a similar situation for fruiting.

ARCYRIA (Hill) Pers.

113. A. OERSTEDTII Rost.

Seattle. Rare, in spring on fir bark.

114. A. NUTANS (Bull.) Grev.

Common and widely distributed in summer, on decorticate, rather dry logs.

115. A. VERSICOLOR Phil.

Mt. Rainier. Late summer, on dead, dry wood.

116. A. INCARNATA Pers.

Exceedingly common and widely distributed, throughout the year, on dead wood.

117. A. FERRUGINEA Sauter.
Ft. Lawton, Seattle. Late fall, on dead wood.

118. A. DENUDATA (Linn.) Sheld.
Mt. Rainier. Late summer, on dead wood.

119. A. CINEREA (Bull.) Pers.
Common and widely distributed at low altitudes in summer and fall, on dead wood.

120. A. DIGITATA (Schw.) Rost.
Vicinity of Seattle. Collected by Mr. John Jackal.

121. A. INSIGNIS Kalbr. & Cooke.
Vicinity of Seattle. Collected by Dr. T. H. Macbride.

PROTOTRICHIA Rost.

122. P. METALLICA (Berk.) Mass.
Mt. Rainier, Mt. Shuksan. Late summer, on fir wood at high altitudes.

HEMITRICHIA Rost.

123. H. SERPULA (Scop.) Rost.
Mt. Rainier. Collected by Dr. T. H. Macbride.

124. H. VESPARIUM (Batsch) Macbr.
Reported by Macbride.

125. H. STIPATA (Schw.) Macbr.
Vicinity of Seattle. Collected by Mr. John Jackal.

126. H. CLAVATA (Pers.) Rost.
Seattle, Port Townsend, Bremerton, Whidby Island, Mt. Rainier. Summer, on dead wood.

TRICHIA (Hall.) Rost.

127. T. INCONSPICUA Rost.
Vicinity of Seattle. Collected by Mr. John Jackal.

128. T. ALPINA Meyl.
Mt. Baker National Forest. Late summer, at 4,000 feet, on the stems of living mountain ash.

129. T. VARIA (Pers.) Rost.
Seattle, Renton. Spring and early summer, on bark and dead wood.

130. T. SCABRA Rost.
Seattle. Fall, on bark and wood.

131. T. PERSIMILIS Karst.
Common and widely distributed in early spring and summer on various substrata.

132. T. FAVOGINEA (Batsch) Pers.

Whidby Island, Bremerton, Mt. Rainier. Summer, at varying altitudes, on wood and bark.

133. T. VERRUCOSA Berk.

Bothell, Seattle, Mt. Rainier. Summer, at varying altitudes, on dead wood.

134. T. BOTRYTIS Pers.

Seattle, Renton, Bremerton, Mt. Rainier. Summer and fall, on dead wood.

135. T. SUBFUSCA Rex.

Mercer Island, Lake Washington. Summer, on dead wood.

136. T. ERECTA Rex.

Seattle. Fall, on fir bark.

137. T. DECIPIENS (Pers.) Macbr.

Very common and widely distributed in fall, at varying altitudes, on dead wood.

138. T. LATERITIA Rex.

Seattle. Mid-summer, on wet, rotten log.

OLIGONEMA Rost.

139. O. BREVIFILUM Peck.

Reported by Macbride.

140. O. NITENS (Lib.) Rost.

Seattle. Late fall, fairly common on bark.

UNIVERSITY OF WASHINGTON,
SEATTLE, WASHINGTON

MYCOLOGICAL NOTES FOR 1926-27[1]

L. O. Overholts

(With Plates 22–25)

1. Heterosporium maculatum Klotzsch.

I collected this species abundantly in the Missouri Botanical Garden in September of 1926, on dead leaves of *Typha latifolia*. The species is probably common on that and related hosts. On comparison with specimens distributed by Klotzsch in Fung. Germ. No. *67* (Mo. Bot. Garden copy) I find agreement in all essentials. The original description gives the spores as 25–28 × 12 μ. I find them in Klotzsch's specimen and in my collection (10307) measuring 13–19 × 6–7 μ. Sporulating specimens have an olivaceous tint under a lens, becoming black as the lighter-colored spores disappear from the darker conidiophores. (Plate 24, Fig. 1.)

2. Phyllosticta Castaneae Ellis & Ev.

Collected for the first time in October, 1925, along Shaver's Creek, Huntingdon County, Pa., on *Castanea dentata*. The following notes were made from the collection:

"Spots indefinite, 3–6 mm. diameter or confluent over larger areas and then limited by the veins of the leaves, cinnamon brown in color, not margined; pycnidia immersed but most conspicuous on the lower surface, minute, black, globose, 70–90 μ diameter; spores elongate, pointed at one end, hyaline, 6–7 × 2 μ."

On living leaves of *Castanea dentata*.

The descriptions given by Seaver in North American Flora, and by Rabenhorst in the Kryptogamen-Flora, state that the pycnidia are epiphyllous. Seaver says "visible only from above." In my collection they are scarcely to be seen from the upper surface but appear distinct as seen from below.

[1] Contribution from the Department of Botany, The Pennsylvania State College, No. 65. Published by permission of the Director of the Agricultural Experiment Station, as Technical Paper No. 449.

3. SCLEROTIUM BIFRONS Ellis & Ev.

This interesting sterile fungus is fairly common in New England on *Populus tremuloides* as a small black tar-like spot on the upper surface of the leaves. In the aspen groves of Colorado I looked for it on several occasions without success in 1923, but finally found it in Boulder Park, near Tolland. It was also collected in the Jackson Hole region of Wyoming in 1926. Its distribution is not coextensive with that of its host. It seems to prefer a cool climate. In sections through the leaves, the fungous mycelium is very conspicuous, but no sign of fruiting bodies is present.

4. SPHAEROGRAPHIUM FRAXINI (Peck) Sacc.

Pycnidia spine-like, erect, flexuous when wet, brittle and prickly to the touch when dry, 1–2 mm. long, black; internally sterile and solid at the base, with an elongated sporiferous locule in the upper half; conidiophores nearly filiform, short; conidia elongated, crescent-shaped, sickle-shaped, or somewhat S-shaped, hyaline, appearing septate, with at least one septum, 42–55 × 3–4 μ.

Bursting through the outer bark on dead limbs of *Fraxinus americana*.

This species was originally described (Ann. Rep. N. Y. State Mus. **29**: 71. 1878) by Peck in the genus *Sphaeronema*. It resembles, both in appearance and structure, *S. acerinum* Peck, but the characters of the spores place it in the Scolecosporae section of the Sphaeroidaceae. The spores are described as multinucleate, and presumably one-celled, as called for in the genus *Sphaerographium*. However, I am of the opinion that they are septate, though the narrowness of the spores makes it difficult to distinguish between what might be abutting guttulae and cross septa. The accompanying illustrations (PLATE 24, FIGS. 2–4) make apparent the nature of the fungus. It is probably not uncommon in this region.

5. CORONOPHORA ANGUSTATA Fuckel.

While searching, in company with Dr. P. Spaulding, for the perithecial stage of *Melanconis Juglandis* (Ellis & Ev.) Graves

on *Juglans cinerea*, at Greenwood Furnace, Pa., an unrecognized Pyrenomycete was collected which on examination was found to have the characteristic many-spored asci shown in PLATE 24, FIG. 5. Not being familiar with an ascomycete so characterized, a portion of the collection was sent to Washington where it was identified by W. W. Diehl as the above species. Ellis and Everhart list only *C. ootheca* (Berk. & Curt.) Sacc. as known from this country and no other reference to this genus has been seen by the writer. Mr. Diehl reports that this is the first American collection known to the Washington herbarium, so that it has apparently not been widely collected, though may occur with some frequency. Unfortunately only a very limited amount of material was found, though further search in the same and in additional localities may bring more collections to light. The perithecia are quite large and occur in clusters of only two and three in this collection, bursting through the outer bark of dead branches of the host.

6. CRYPTOSPHAERIA POPULINA (Pers.) Sacc.

This was collected on dead willows, probably *Salix purpurea*, in a willow holt at Greenwood Furnace, Pa., Nov. 26, 1927, by Overholts and Spaulding. Ellis and Everhart record only *Populus* as a host. The collection is identical both externally and internally with my understanding of the fungus as it occurs on *Populus* in this region. (Overholts Herbarium 10744.) Spores very pale smoky-olivaceous, allantoid, 8.5–10 × 2–2.5 μ.

7. MYCOSPHAERELLA MACULIFORMIS (Pers.) Peck.

Every year I have collected in quantity on *Castanea* a fungus I have referred to *Phyllosticta maculiformis* Sacc. Rabenhorst and Ellis and Everhart report it as usually sterile in this stage collected in late autumn. It rarely appears much before about the time the leaves are being shed, but then very abundantly, and I have never failed to find it producing countless spermatoid spores. This year (1926) I collected on May 22, on overwintered leaves of *Quercus prinus*, a fungus that seems to be the perfect stage and is referable to *Mycosphaerella maculiformis* (Pers.) Peck. My collection is only beginning to mature

its spores and I find them 7–9 × 1.5–2 μ, which is somewhat smaller than given by others (9–14 × 3–4).

8. PROPOLIS FAGINEA (Schrad.) Karst. and Related Species.

Not much is known in this country concerning the distribution of the small wood-inhabiting apothecial fungi in the Orders Pezizales and Phacidiales. *Propolis faginea* (PLATE 22, FIG. 3; PLATE 23, FIG. 4) is represented in the herbarium of the Missouri Botanical Garden only by Wilson and Seaver's Ascomycetes and Lower Fungi, No. 44, and by the same collection from the herbarium of the North Dakota Agricultural College and Experiment Station, No. *17*.

The species was collected by the writer in November, 1926, at Arcadia, Mo., on dead wood; in Center Co., Pa., 1927, on *Hamamelis* (No. *10858*); on a dead limb on the ground in Clarion Co., Pa., 1927 (No. *10525*); on dead wood, Estes Park, Colo., Oct. 1927, by E. C. Smith (No. *10928*); and on an old *Strumella corynoidea* canker on *Quercus*, Nov. 1927, State College, Pa. (No. *10761*).

In addition to this habitat on various kinds of dead hardwoods, the old dead cones of *Pinus virginiana* and *P. pungens* and the outer dead bark of *Pinus rigida* are substrates in central Pennsylvania for a fungus that I have filed under *P. rhodoleuca* var. *strobilina* (Desm.) Phillips, based on a tentative determination by Dr. Dearness and compared with specimens so determined by Rehm. This plant was originally described as *P. strobilina* Desm., and both this and *P. rhodoleuca* (Sommerf.) Fries have been referred to *P. faginea* by some. Evidently the members of this group are very closely related to each other, and perhaps should all be referred to the same species.

On picking up this fungus, one who is familiar with *Sphaerobolus stellatus* might think he had that species in hand, since the small apothecia are sunken into the wood and never become strongly erumpent. The white hymenial surface surrounded by the ruptured wood tissue heightens this impression. The appearance of the fungus is well shown in the accompanying illustration (PLATE 23, FIG. 4).

The hymenium is fleshy when fresh and somewhat pulverulent.

When first making this identification I examined the Seaver and Wilson collection cited above. The spores there measure 15–18 × 6–7 μ and the content is broken up into two or three sections much as in the young spores of a *Pezicula*, prior to formation of septa. However, here they are said always to be unicellular and I have seen no further evidence that they do become septate. Rabenhorst gives the spore measurements as 21–27 × 6–8 μ. In my No. *10411* they measured 15–21 × 6–7 μ, in No. *10525*, 24–30 × 5–6 μ, and in No. *10792*, 15–18 × 6–9 μ. This latter number is from a collection referred to the var. *strobilina* on the loose outer bark of *Pinus rigida*. I am inclined to regard these variations in measurements as a factor of the age of the plant and to consider that probably they should all be referred to one species. The paraphyses are very narrow, 1–2 μ diameter, and branch at their apices, the branches in the Seaver and Wilson collection being considerably agglutinated to form an epithecium, and much less so in the other collections. The appearance of the fungus in section is shown in PLATE 22, FIG. 3, and the asci, spores, and paraphyses in PLATE 24, FIG. 6.

9. VALSA AND CYTOSPORA on Conifers.

The tree-inhabiting valsas and their imperfect stages in *Cytospora* present a difficult problem to both the mycologist and the pathologist. Little work has been done on the possible parasitism of these fungi. They are not uncommon on the lower dead branches of small pine trees, on sunscald areas on the bark, on the tips of white pine killed by the weevil, and in other similar situations where their parasitism is not clearly defined. The following field observations have accumulated over a period of several years.

A species I am referring to *V. Abietis* Fries has been collected as follows: on *Thuja orientalis* at State College, Penna., in 1922 (No. *8321*), on recently killed young trees with appearance as though parasitic, no other organism observed to be present; on *Larix americana* at Newcombe, N. Y., in 1924, but in the *Cytospora* stage only, on young trees with a considerable amount of winter injury, and only on the lower branches; on a recently killed sapling of *Abies balsamea*, at Willey Station, N. H., in

1924 (No. *9761*); and on recently killed trees of *Pseudotsuga mucronata* of considerable size (6–8 in. diameter) at Tolland, Colorado, in 1923 (No. *10248*). (PLATE 23, FIG. 5.) On these trees the fungus inhabited conspicuous cankered areas with the bark considerably split, and with some resin exudate. This seemed at the time as a rather clear-cut case of parasitism but inoculation experiments were not conducted.

The fungus I am referring here agrees with the above-named species as distributed in Fungi Columbiani No. *4999*. The ascospores are 6–9 × 1.5 μ and the perithecial pustules are very conspicuous, as they occur erumpent through the bark of smooth-barked trees.

Another species I had called *V. Pini* (Alb. & Schw.) Fries, until Dr. Dearness pointed out its resemblance to *V. collicula* (Wormsk.) Cooke, is common on *Pinus Strobus* in the Allegheny region. The ascospores are smaller than in either *V. Abietis* or *V. Pini* and measure 4–6 × 1 μ. I have it on a very recently killed sapling from Wayne Co., Pa. (No. *10785*); on a sunscald area on a living tree from Allegheny County, Pa. (No. *8004*); on a small dead sapling at Tupper Lake, N. Y. (No. *9621*) (PLATE 22, FIG. 2); on what appeared to be a frost canker in Huntingdon Co., Pa. (No. *8332*); one collection from a tree girdled with the "basal canker," sometimes attributed to ant injury, from the same locality (No. *8198*); and one collection from a sunscald area in the top of a 30-foot *Pinus sylvestris* in Allegheny Co., Pa. (No. *7988*). (See PLATE 24, FIG. 7.)

10. CLAUDOPUS SUBDEPLUENS Fitzpatrick.

On August 22, 1926, after copious rains, I collected on the College Campus a small *Claudopus* parasitic on the hymenium of specimens of *Cantharellus cibarius*. (PLATE 22, FIG. 1.) On comparing this with Fitzpatrick's description of the above species (Mycologia **7**: 37. 1915) it becomes apparent that the only points in which it differs from that species are in the host —the type being on *Polyporus perennis*—and in the fact that the margin of the pileus is not sulcate in my specimens. The upper surface of my specimens is distinctly silky tomentose while *C. subdepluens* is described as tomentose. The spores

agree well, my measurements being 9–11 × 6–8 μ, angular, pinkish in color. I am convinced that I have here a form of that species and undoubtedly the list of host species will eventually be considerably extended. Dr. Fitzpatrick has pointed out to me that perhaps *Leptonia parasitica* Quél. (Bull. Bot. Sci. France **25**: 287–292. 1878) is identical with his species. This species was described as on *Cantharellus cibarius*, and very likely is the same plant. It would appear to me to be better placed in *Claudopus* than in *Leptonia*.

11. NOTES ON CORTICIUM.

Corticium ermineum Burt. I studied sections of the type collection of this in 1927. (PLATE 24, FIG. 8.) Dr. Burt places this species among those thin white species not known to have chlamydospores. What these "chlamydospores" really are is not known, but in many instances they duplicate the form and size of the basidiospores and are to be regarded as basidiospores that have lodged on and become distributed through the subhymenial tissue. My sections of the type of this species show an abundance of these imbedded spores particularly in the upper half of the fructification. (PLATE 24, FIG. 9.) Curiously enough the type collection gives some evidence, though not quite conclusive, of representing a growth of two years. Such a renewal of vigorous growth immediately following a period of sporulation would in itself be enough to cause many of the basidiospores to become overgrown and enmeshed in the tissues of the new growth. Dr. Burt also reports no clamp connections on the hyphae of the subhymenial region. But clamps are present in considerable numbers in two sets of sections I made from the type collection. His records for spore size are scarcely large enough. I find spores along the surface of the hymenium up to 12 μ long (7–9 by Burt).

Corticium apiculatum Bres. This species was described by Bresadola from Weir's collection in Idaho. Bresadola does not mention gloeocystidia and Burt records the species as lacking them. I have not studied material from the type collection, but in one of my collections (*3167*), cited by Burt as belonging here, gloeocystidia are present, though relatively inconspicuous.

They are found imbedded in the subhymenial tissue, and measure about 20 × 6–8 μ. The subhymenium is fairly compact and they do not show up well until the sections have stood in KOH and eosin for about half an hour. Then they are not difficult to detect. Bresadola's spore record of 5–6 × 3 μ is in better agreement with my specimen than is Burt's (4.5–5 × 2.5–3 μ).

Corticium Overholtsii Burt. In 1918 I sent to Dr. Burt a specimen of *Corticium* on bark of *Pinus rigida* which he subsequently described (Ann. Missouri Bot. Gard. **13**: 245. 1926) under the above name. The species was described as lacking gloeocystidia. On receiving a similar collection this year from Dr. P. Spaulding, again on bark of *Pinus rigida*, from Wakeby, Mass., I was led to compare it with the above species. The Massachusetts collection had rather abundant gloeocystidia, but they did not become very apparent until the sections had stood for some time in KOH and eosin on the slide. A thorough search through the genus failed to reveal a species so characterized. Recalling the general similarity to *C. Overholtsii* I again sectioned a part of the original collection of that species and found exactly the same situation. Gloeocystidia are rather numerous but quite inconspicuous at first—in fact, barely discernible when the sections are first mounted. But after standing for an hour or more they became more conspicuous and could then be discerned in numbers. In some places they became very conspicuous, though here again it has been necessary to crush out one set of sections before I could be sure of them. They are elongated elements arising at some distance below the basidial layer and extending up between the basidia and occasionally with the tips barely projecting, and measure 7–9 μ in diameter at the thickest portion. (PLATE 25, FIG. 10.)

Otherwise the species is well described in the original except for a color variation in the Massachusetts collection. There the color is light cinnamon buff or vinaceous cinnamon (Ridgway) and hence considerably darker than in the types. In every other character the agreement is extremely close. In the subhymenium the walls of the hyphae are gelatinously modified, but again this is not very apparent, or at least becomes much more conspicuous after the sections stand in KOH for several

hours. In glycerine preparations, however, the character once established remains quite conspicuous.

The Massachusetts collection is No. *16995* of the U. S. Timber and Forest Disease Survey.

Corticium Pruni *n. sp.* Plants entirely resupinate, at first in small orbicular patches about 1 cm. diameter at the lenticels of the bark, soon effused and confluent to 5 cm. or more, adnate, cream-color, or ivory yellow to cream buff, becoming somewhat cracked on drying, thinning out on the margin, glabrous; in section 200–300 μ thick, divided into two nearly equal layers, a lower layer of longitudinally and compactly arranged hyphae, and a subhymenial layer that bears numerous gloeocystidia and in which the hyphae are sub-erect; spores oblong-ellipsoid or short-cylindric, hyaline, smooth, 5–6 $\times$ 3 μ; hymenial cystidia lacking; gloeocystidia abundant, elongate, 6–7 μ diameter, entirely imbedded and tapering into a narrow flexuous hyphal portion that penetrates through the basidial layer but does not project; hyphae branched, hyaline, with very inconspicuous cross walls and clamps, diameter 2–3 μ.

On bark of dead *Prunus*. North Conway, N. H., Aug. 18, 1918. L. O. Overholts, No. *5111*. (PLATE 23, FIG. 6; PLATE 25, FIGS. 11, 12.)

The species is similar in aspect to *Peniophora albula* Atk. & Burt. but has prominent gloeocystidia with granular content. Externally it is similar to some collections of *Peniophora mutata* and *P. Allescheri* but the spores are very much shorter and the hyphae much smaller, while in sections made at a half dozen different places I have failed to find cystidia, although in some sections a few of the gloeocystidia do not taper to the narrow elongated tip. Another near relative is *Corticium stramineum* Bres. from which it differs in the thicker fruiting body and in the abruptly narrow tips of the gloeocystidia. As in that species there is a definite substratal layer of horizontal hyphae. Neither is there any indication that the fungus would ever grow pileate, and it is, therefore, probably not a *Stereum*. The cream color, the two layers of the subhymenium, and the presence of gloeocystidia but no cystidia, with short spores 4–6 $\times$ 3 μ, would appear to be the distinguishing features of the species.

12. **Hypochnus pennsylvanicus** sp. nov.

Effused for only a few centimeters, rather thick and compact for the genus, "olive buff" or "pale olive buff," separating easily as a thin membrane, the margin somewhat fimbriate and with a few mycelial cords of the same color; in section 150–180 μ thick, the subhymenium loosely constructed of pale ascending hyphae 4–6 μ diameter, with cross walls but no clamp connections; spores globose, echinulate, hyaline under the microscope, 5–6 μ diameter; cystidia none; basidia 6–7 μ diameter.

On rotten bark of *Carya*.

Type collected at Musser Gap, Center Co., Pa., Nov. 25, 1927, by L. O. Overholts and P. Spaulding (Overholts Herb. *10773*).

The species is apparently closely related to *H. cinerascens* Karst., but is of rather different color, thinner, and the hyphae lack clamp connections. In Burt's treatment of the genus it falls near *H. zygodesmoides* (Ellis) Burt, from which the very different color and the habitat would seem to distinguish it. The structure in section is shown in PLATE 25, FIG. 13.

13. STEREUM RUGISPORUM (Ellis & Ev.) Burt.

This species is not uncommon in the Rocky Mountain States. I have collected it several times in Colorado—always on coniferous wood. On first meeting it, one who is familiar with *Stereum fuscum* (Schrad.) Quel. (= *S. bicolor* Pers.) will be tempted to refer it to that species, with which its superficial aspect is in rather close agreement, but from which it differs in internal structure and in being confined to coniferous wood. Since no good illustrations of its internal structure have appeared, I take the opportunity offered on the receipt of a specimen recently from E. C. Smith, Fort Collins, Colo., to elucidate that point.

The specimens are thick and spongy for a *Stereum* and when the hymenium is examined under a hand lens it may show one of three conditions: (*a*) There may appear prominent, very slender bristles or hairs protruding from the hymenium. These are of the nature of brown cystidial hyphae, 7 to 9 μ diameter, thick walled, and projecting up to 135 μ. They are not setae, in spite of their brown coloration, for they do not become darker in KOH solution as do setae in other genera of Hymenomycetes.

(*b*) The hymenium may be smooth, *i.e.* without these hairs, which in such cases have probably been broken off in handling the specimen, since in all cases sectional preparations show them to be present in the hymenium and the subhymenium. Moreover, they are extremely fragile—so much so that in cutting sections it is necessary to so orient the hymenial surface in the pith that the latter does not press upon these hairs. Otherwise, at least the longer of them will be broken off. (*c*) The hymenium may have the appearance of being covered and somewhat pruinose from the presence of small curved glistening-white mycelial or cobwebby filaments. I have seen a few cases where these appear to originate, perhaps only in young specimens, as hyaline hyphae growing out from the lumen of broken ends of these cystidia, and curving back over the hymenial layer in the form of shepherd's crooks.

Internally, sections of one-year-old specimens show a layer of elongate basidia between which these cystidia protrude conspicuously. (PLATE 25, FIG. 14.) Also many of the latter appear, in older specimens at least, never to reach the surface of the hymenium, but are completely imbedded. Basidiospores are usually abundant in the specimens I have examined and are as described by Burt, except that they frequently reach sizes of as much as $15 \times 6\ \mu$. In my collections both basidia and spores are so large and the latter so constantly present that the species is an excellent one for class use in demonstrating a functional basidial hymenium. The sterigmata are unusually large, measuring 6–8 μ long.

In the subhymenium and often in the basidial layer Burt describes the presence of brown spore-like bodies as occurring in many specimens though not in all. I find the same in my specimens. Unfortunately Burt's illustration of those bodies is not at all typical. I have seen bodies such as he represents deep in the subhymenium, or really in the context tissue of the pileus, and they are different in appearance from the spore-like bodies, having more the appearance of small bundles of organic material as though of a small knot of extremely minute hyphae, but they are so dense that their structure cannot well be made out. (PLATE 25, FIG. 15.) The spore-like bodies, when present,

are nearer the basidial layer and show definitely the form of spores, though often they are grouped in twos, threes, or fours. (PLATE 25, FIG. 16.) It is, of course, possible that the knotted bodies are clumps of these spore-like bodies that have undergone disintegration, but even in the most favorable sections they show nothing of such an origin.

My illustration of the hymenial region (PLATE 25, FIG. 14) shows but a single layer of basidia, but the fungus is evidently perennial as the hymenium becomes several layered in age.

14. PORIA CORTICOLA (Fries) Cooke.

Since my previous description (Bull. Torr. Bot. Club **50**: 245–247. 1923) of this species, I have received many additional specimens and have studied each one with care. I am compelled, as a result, to allow still more latitude in the matter of cystidia. Certain collections, typical in all other respects, show American plants to possess at times cystidia that are even more conspicuous than those of European plants communicated by Romell. They are very heavily incrusted with large, coarse, often sharp-pointed crystals as seen in the accompanying illustration (PLATE 25, FIGS. 17, 18). These together with the highly characteristic hyphae already illustrated make this form of the species very easy to recognize. In addition to the collections previously reported, I have additional ones from Winnipeg, Canada, G. R. Bisby, *1180*, *1335;* Bethel, Vt., P. Spaulding, no. *16926*, on *Populus tremuloides;* Cheekye, Brit. Col., on *Thuja plicata*, J. S. Boyce (*1069*); Denver, Colo., on *Populus Sargentii*, E. Bethel.

15. PORIA DECOLORANS (Schw.) Cooke.

Several of the species described by Peck and by Schweinitz are known only from the original collections. This may not be due so much to the rarity of the species as to the fact that this group presents difficulties of identification that have discouraged collecting. It is a real pleasure to re-discover these old species. The latest one to come to my attention is a collection of *P. decolorans*, taken near State College, Nov. 25, 1927, on an old hickory log, by the writer in company with Dr. P. Spaulding. The type collection is not abundant and yielded rather unsatisfactory

results when studied by me several years ago. However, the large amount of crystalline material in the tramal tissue near the bottom of the tubes, often indefinite in arrangement but at times as rather definite incrusted cystidia, the globose spores, and the strong discoloration on drying were pointed out then as characteristic features of the species.

I can add little, however, to the diagnosis already given (Mycologia **15**: 213. 1923). The spores seem to be 5–6 μ diameter rather than 4–5 μ. The same accumulation of crystalline material is found near the bottom of the tubes and in all other respects the collection duplicates the type, except that I would describe this collection as separable from the substratum rather than as inseparable. The color of the fresh material is white, but, on drying, part has become smoky-black and part yet darker.

THE PENNSYLVANIA STATE COLLEGE,
STATE COLLEGE, PA.

EXPLANATION OF PLATES

PLATE 22

Fig. 1. *Claudopus subdepluens* on the hymenium of *Cantharellus cibarius*. Collected at State College, Pa., Aug. 22, 1926. × 2.

Fig. 2. *Valsa collicula*. Vertical section through perithecial stroma. Overholts Herb. 9621. × 79.

Fig. 3. *Propolis faginea*. Vertical section through an erumpent apothecium. Overholts Herb. 10792. × 110.

PLATE 23

Fig. 4. *Propolis faginea*. Decorticated limb showing the white erumpent apothecia. Overholts Herb. 10525. × 3.

Fig. 5. *Valsa Abietis*. Pycnidial pustules with spore horns, in a dead area in the bark of living *Pseudotsuga mucronata*. Overholts Herb. 10248. × 2.

Fig. 6. *Corticium Pruni*. Photo of a portion of the type collection. Overholts Herb. 5111. × 1.

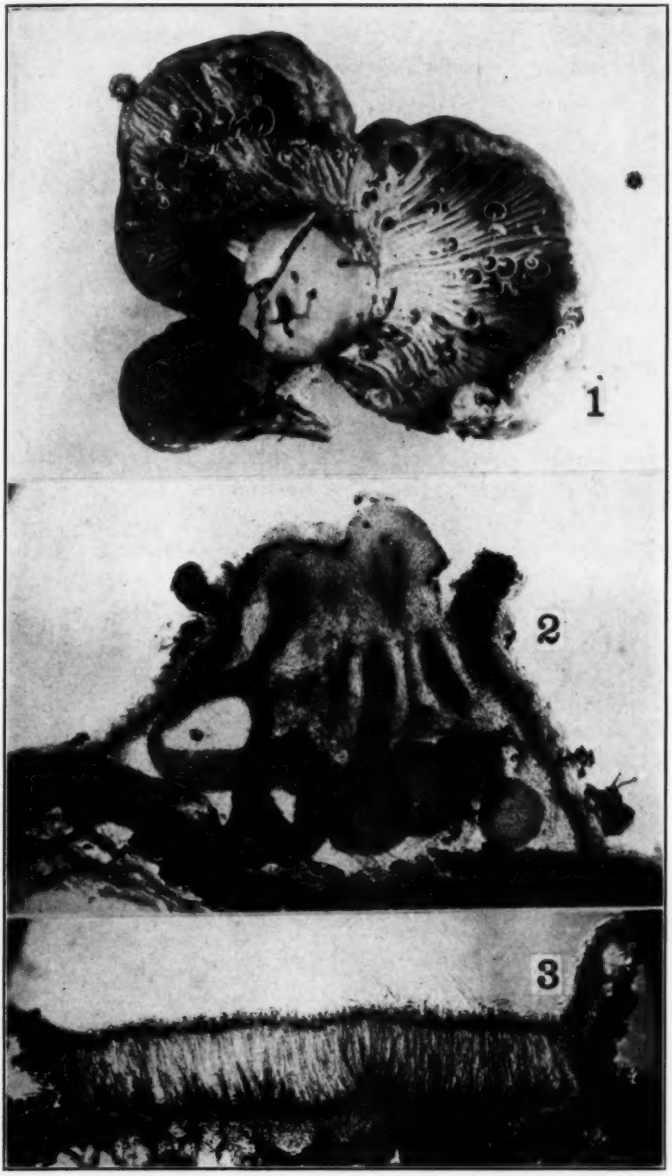
PLATE 24

Fig. 1. *Heterosporium maculatum*. A. Conidiophores and conidia. No. 10307. B. Spores from Klotzsch, Fungi Ger. 67. × 425.

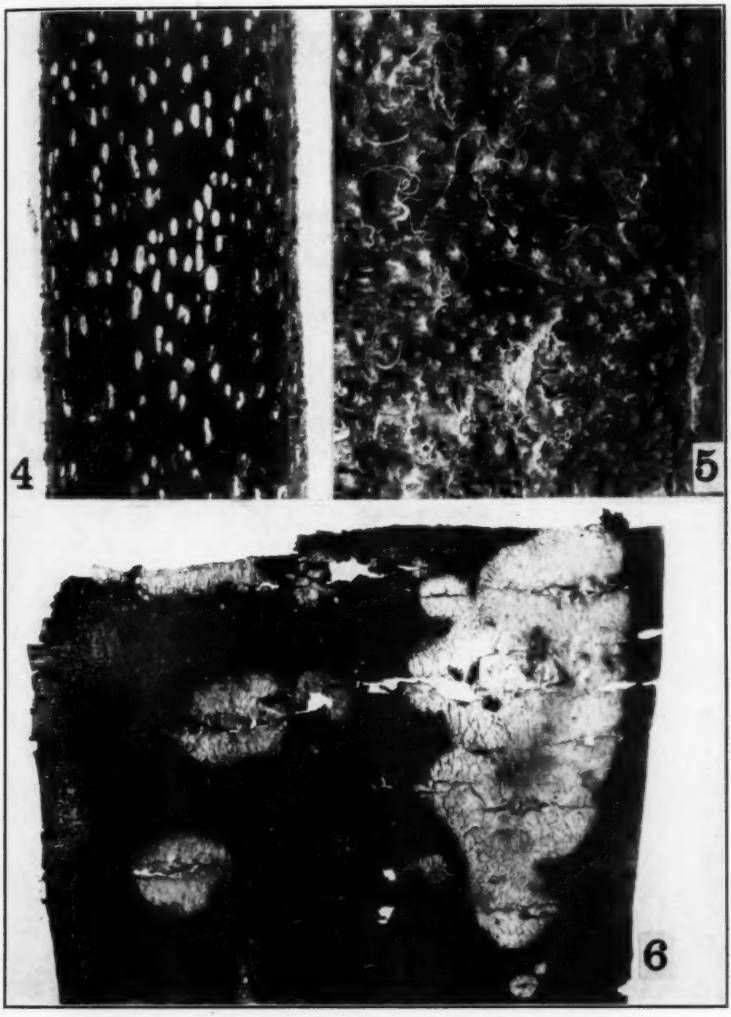
Fig. 2–4. *Sphaerographium Fraxini*. 2. Longitudinal section through the stalked spine-like pycnidium, showing the locule in the upper portion. × 75. 3. The elongated spine-like fruiting bodies on branch of *Fraxinus*. × 1½. 4. Spores from the pycnidium. × 425. No. 10784.

Fig. 5. *Corynophora angustata*. Asci and spores. × 425. No. 10752.

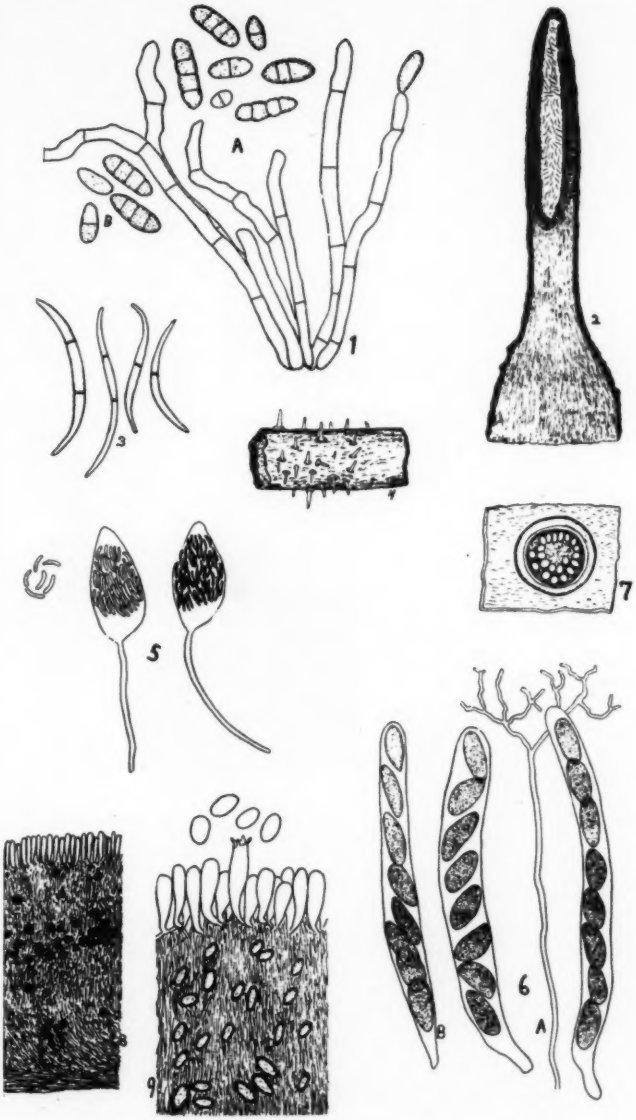
Fig. 6. *Propolis faginea*. A. Asci, spores, and a single branched paraphysis. No. 10792. B. Single ascus with spores. No. 10794. × 425.



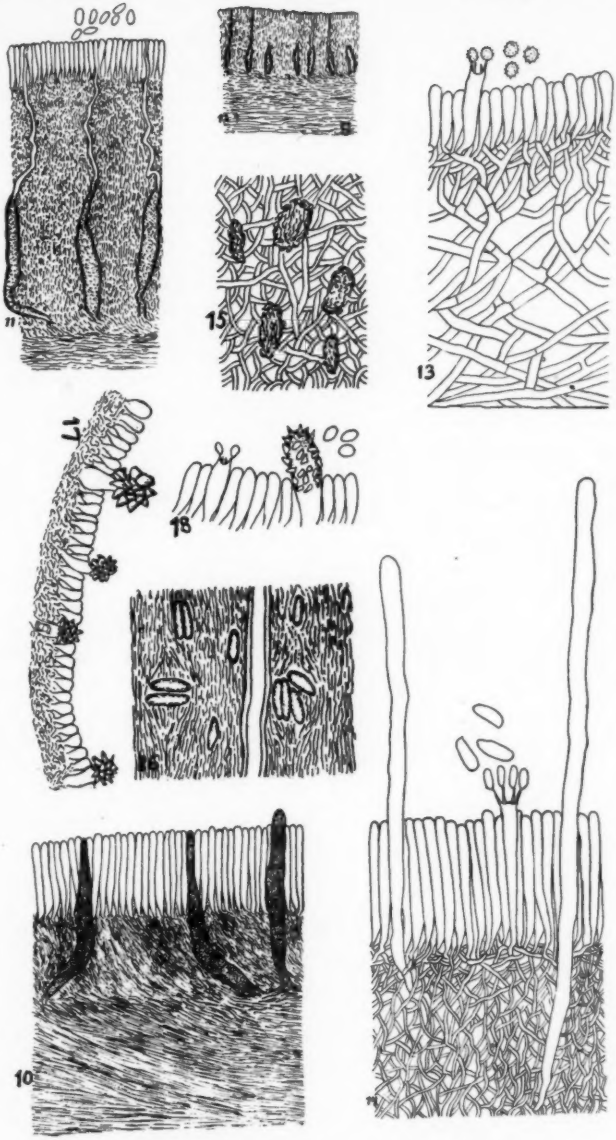
1. CLAUDOPUS SUBDEPLUENS; 2. VALSA COLLICULA; 3. PROPOLIS FAGINEA



4. PROPOLIS FAGINEA; 5. VALSA ABIETIS; 6. CORTICIUM PRUNI



1. HETEROSPORIUM MACULATUM; 2–4. SPHAEROGRAPHIUM FRAXINI;
5. CORONOPHORA ANGUSTATA; 6. PROPOLIS FAGINEA;
7. VALSA COLLICULA; 8–9. CORTICIUM ERMINEUM



10. CORTICIUM OVERHOLTSII; 11–12. CORTICIUM PRUNI; 13. HYPOCHNUS PENNSYLVANICUS; 14–16. STEREUM RUGISPORUM; 17–18. PORIA CORTICOLA

Fig. 7. *Valsa collicula.* Perithecial stroma with the upper portion cut off, to show the number and arrangement of the internal locules. No. 10785. × 6.

Fig. 8, 9. *Corticium ermineum.* 8. Vertical section through fruiting body, showing the narrow substratal layer of horizontal hyphae and the layer of crystalline material below the hymenium. × 50. 9. Vertical section through the hymenial layer and the adjacent subhymenium, showing spores, basidia, and the imbedded spores. × 425. Both from the type collection.

PLATE 25

Fig. 10. *Corticium Overholtsii.* Vertical section through fruiting body, showing the imbedded gloeocystidia. From type. × 425.

Fig. 11, 12. *Corticium Pruni.* 11. Vertical section through the upper half of the fruiting body, showing spores, basidia, and the flexuous gloeocystidia with attenuate tips reaching the level of the hymenium. × 310. 12. Vertical section through the entire fruiting body, showing the location of the gloeocystidia. × 85. Both from type collection.

Fig. 13. *Hypochnus pennsylvanicus.* Vertical section through fruiting body. × 320. From type collection.

Fig. 14–16. *Stereum rugisporum.* 14. Vertical section through the hymenial and subhymenial region of the fruiting body, showing cystidia and spores. No. 10414. × 400. 15. Irregular knotted bodies found in the deeper portion of the subhymenium. × 800. 16. A small portion from the subhymenium, showing the imbedded spore-like bodies. A portion of a cystidium crosses the section. Herb. Mo. Bot. Garden 62967. × 800.

Fig. 17, 18. *Poria corticola.* 17. Section of hymenial layer showing cystidia with large irregular crystals. × 600. 18. A single cystidium in the hymenium, of somewhat different form; also spores. × 800. Both from No. 7941.

COLLECTIONS OF RUSTS MADE IN NEW YORK STATE

W. R. Hunt

Three months of the field season of 1927 were spent by the writer in the southwestern part of the Central Adirondacks, five days on Long Island and part of a day on Fishers' Island.

Rust collections were made whenever the opportunity presented itself. They are deposited in the Pathological Collections of the Bureau of Plant Industry, Washington, D. C., and in the writer's herbarium, which is at Osborn Botanical Laboratory, Yale University.

The Mohawk, Black and Moose river valleys are great repositories for host plants, but there is a scarcity of parasitic fungi, especially of the order Uredinales. Comparatively few host plants were seen on Long Island or Fishers' Island, as it was late in the season.

A total of ninety-seven collections and observations was made, representing nine genera and forty-two species. They are listed alphabetically. The observations are marked by an asterisk. The following are not listed in Arthur's North American Flora from New York state: *Coleosporium Solidaginis* on *Pinus resinosa* and *Aster prenanthoides; Cronartium ribicola* on *Ribes prostratum; Gymnoconia interstitialis* on *Rubus villosus; Melampsora americana* on *Salix fragilis; M. Euphorbiae* on *Euphorbia Cyparissias; Peridermium Cerebrum* on *Pinus sylvestris; Puccinia Urticae* on *Carex vesicaria* var. *monile* and *Uromyces caryophyllinus* on *Dianthus Caryophyllus* (listed in early state agriculture experiment stations reports).

Coleosporium delicatulum (Arth. & Kern) Hedge. & Long. On *Solidago graminifolia* (L.) Salisb.: III, Boonville, Sept. 23, '27.

Coleosporium Solidaginis (Schw.) Thüm. On *Pinus resinosa* Ait.: I, Forestport, July 10, '27; I, Woodgate, July 12, '27. On *Aster prenanthoides* Muhl.: II, Boonville, Sept. 7, '27. On *Aster sp.:* II–III, Cold Spring Harbor, L. I., Nov. 19, '27;

II, Westbury, L. I., Nov. 18, '27. On *Solidago bicolor* L.: II–III, Boonville, Sept. 23, '27. On *Solidago juncea* Ait.: II, Boonville, Oct. 1, '27. On *Solidago rugosa* Mill.: II, Bald Mt., Sept. 5, '27; II, Boonville, Sept. 7, '27; II, Woodgate, Sept. 6, '27.

CRONARTIUM COMPTONIAE Arth. On *Pinus sylvestris* L.: I, Woodgate, July, '27. On *Myrica asplenifolia* L.: II–III, Central Islup, L. I., Nov. 20, '27.

CRONARTIUM RIBICOLA Fisch. On *Ribes prostratum* L'Her.: III, Bald Mt., Sept. 5, '27.

GYMNOCONIA INTERSTITIALIS (Schl.) Lagerh. On *Rubus sp.* (wild raspberry): I, Old Forge, July 4, '27. On *Rubus sp.* (wild blackberry): I, Woodgate, July 9, '27. On *Rubus sp.* (wild red raspberry): III, Woodgate, Aug. 21, '27. On *Rubus villosus* Ait.: III, Woodgate, Aug. 22, '27.

* GYMNOSPORANGIUM GERMINALE (Schw.) Kern. On *Juniperus virginiana* L. was observed to be rather common in the region of Cold Spring, L. I.

GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE Schw. On *Juniperus virginiana* L.: III, Cold Spring, L. I., Nov. 21, '27; Cold Spring Harbor, L. I., Nov. 19, '27.

GYMNOSPORANGIUM SP. On *Crataegus sp.:* Forestport, July 10, '27.

KUEHNEOLA ALBIDA Magn. On *Rubus allegheniensis* Porter: II, Boonville, Sept. 23, '27; II, Woodgate, Aug. 21, '27. On *Rubus hispidus* L.: II, Woodgate, Aug. 21, '27.

MELAMPSORA AMERICANA Arth. On *Salix cordata* Muhl: II–III, New Hartford, Sept. 28, '27. On *S. fragilis* L.: II–III, Boonville, Sept. 26, '27. On *S. petiolaris* Sm.: II, Woodgate, Sept. 1, '27. On *Salix sp.:* II, Boonville, Sept. 7, '27.

MELAMPSORA EUPHORBIAE (Schüb.) Cast. On *Euphorbia Cyparissias* L.: II, Boonville, Sept. 7, '27.

MELAMPSORA MEDUSAE Thüm. On *Populus tremuloides* Michx.: II, Boonville, Sept. 7, '27; II, Woodgate, Aug. 21, '27.

* PERIDERMIUM CEREBRUM Peck. The aecial stage of *Cronartium Quercus* (Brond.) Schröt. on *Pinus sylvestris* L. was observed on Fishers' and Long Island but no collections were made.

PHRAGMIDIUM POTENTILLAE-CANADENSIS Diet. On *Potentilla canadensis* L.: II–III, New Hartford, Sept. 28, '27.

PHRAGMIDIUM ROSAE-SETIGERAE Diet. On *Rosa carolina* L.: III, Fishers' Island, Nov. 17, '27.

PUCCINIA ANDROPOGI Schw. On *Andropogon scoparius* Michx.: III, Fishers' Island, Nov. 17, '27; Central Islup, L. I., Nov. 20, '27.

PUCCINIA ANEMONES-VIRGINIANAE Schw. On *Anemonae virginiana* L.: III, Boonville, Sept. 26, '27.

PUCCINIA ANGUSTATA Peck. On *Scirpus cyperinus* (L.) Kunth.: II–III, Woodgate, Sept. 1, '27.

PUCCINIA ASPARAGI DC. On *Asparagus officinalis* L.: II–III, Boonville, Oct. 1, '27.

PUCCINIA ASTERIS Duby. On *Aster cordifolius* L.: III, Cold Spring Harber, L. I., Nov. 19, '27.

PUCCINIA ASTERUM (Schw.) Kern. On *Solidago sp.*: 0–I, Forestport, July 10, '27.

PUCCINIA BARDANAE Corda. On *Arctium minus* Bernh.: III, Boonville, Oct. 1, '27.

PUCCINIA CLEMATIDIS (DC.) Lagerh. On *Clematis virginiana* L.: 0–I, Forestport, July 10, '27. On *Agropyron repens* (L.) Beauv.: II, Boldt Island, St. Lawrence River, Aug. 14, '27; II, Clinton, Sept. 15, '27; II, Woodgate, Sept. 1, '27.

PUCCINIA CNICI Mart. On *Cirsium lanceolatum* (L.) Hill: II–III, New Hartford, Sept. 28, '27.

PUCCINIA CORONATA Corda. On *Avena sativa* L.: II–III, Westbury, Nov. 18, '27. On *Holcus lanatus* L.: II, Central Islup, L. I., Nov. 20, '27; II–III, Woodgate, Sept. 6, '27.

PUCCINIA GRAMINIS Pers. On *Berberis vulgaris* L.: 0–I, Forestport, July 10, '27. On *Agrostis alba* L.: II–III, Boonville, Sept. 7, '27; II, Central Islup, L. I., Nov. 20, '27; III, New Hartford, Sept. 28, '27; III, Woodgate, Sept. 1, '27. On *Phleum pratense* L.: II, Big Moose Lake, Sept. 5, '27; II, Boonville, Sept. 7, '27; II, New Hartford, Sept. 28, '27; II, Westbury, L. I., Nov. 18, '27; II, Woodgate, Sept. 1, '27.

PUCCINIA GROSSULARIAE (Schum.) Lagerh. On *Carex scabrata* Schw.: II–III, Bald Mt., Sept. 7, '27. On *Carex debilis* var. *Rudgei* Bailey: II–III, Boonville, Sept. 7, '27.

PUCCINIA HIERACII (Schum.) Mart. On *Taraxacum officinale* Weber: II, Boonville, Sept. 15, '27; II, Forestport, July 10, '27; I, New Hartford, Sept. 28, '27; II–III, Roslyn, L. I., Nov. 22, 27; II, Woodgate, July 9, '27.

PUCCINIA MALVACEARUM Bert. On *Althaea rosea* Cav.: III, Clinton, Sept. 16, '27; III, Cold Spring Harbor, L. I., Nov. 19, '27; III, Woodgate, July 9, '27. On *Malva rotundifolia* L.: III, Clinton, Sept. 28, '27; III, Cold Spring Harbor, L. I., Nov. 19, '27.

PUCCINIA MENTHAE Pers. On *Mentha spicata* L.: II–III, New Hartford, Sept. 28, '27. On *Satureja vulgaris* (L.) Fritsch: II–III, Boonville, Sept. 7, '27.

PUCCINIA PIMPINELLAE (Str.) Mart. On *Osmorhiza sp.*: II–III, Cold Spring Harbor, L. I., Nov. 21, '27.

PUCCINIA POARUM Niel. On *Poa annua* L.: II, Westbury, L. I., Nov. 18, '27.

PUCCINIA SUAVEOLENS (Pers.) Rostr. On *Cirsium arvense* (L.) Scop.: III, Boonville, Sept. 23, '27; III, New Hartford, Sept. 28, '27.

PUCCINIA URTICAE (Schum.) Lagerh. On *Carex versicaria* var. *monile* (Tuckerm.) Fern.: II–III, Boonville, Sept. 23, '27.

PUCCINIA VIOLAE (Schum.) DC. On *Viola eriocarpa* Schwein.: III, Boonville, Sept. 7, '27. On *Viola sp.*: III, Bald Mt., Sept. 5, '27; III, Big Moose Lake, Sept. 5, '27.

UROMYCES CARYOPHYLLINUS (Schrank) Wint. On *Dianthus Caryophyllus* L.: II, Clinton, Sept. 15, '27.

UROMYCES HYBRIDI Davis. On *Trifolium hybridum* L.: II–III, Forestport, July 10, '27; II–III, New Hartford, Sept. 28, '27; III, Westbury, L. I., Nov. 18, '27; II, Woodgate, July 12, '27.

UROMYCES HYPERICI-FRONDOSI (Schw.) Arth. On *Hypericum virginicum* L.: II–III, Forestport, Aug. 22, '27.

UROMYCES PEDATATUS (Schw.) Sheldon. On *Andropogon virginicus* L.: III, Westbury, L. I., Nov. 18, '27.

UROMYCES SILPHII (Burr.) Arth. On *Juncus tenuis* Willd.: II–III, Deer Range Park, L. I., Nov. 20, '27.

UROMYCES TRIFOLII (Hedw. f.) Lév. On *Trifolium pratense* L.: II–III, Boonville, Sept. 7, '27; II–III, New Hartford, Sept. 28, '27; II–III, Westbury, L. I., Nov. 18, '27.

UROMYCES TRIFOLII-REPENTIS (Cast.) Liro. On *Trifolium repens* L.: II–III, Boonville, Sept. 15, '27; II–III, Johnstown, July 9, '27.

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HISTORY OF MYCOLOGICAL COLLECTORS IN COLORADO[1]

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Mycological work in the state of Colorado, as well as in all the Rocky Mountain states, is a branch of botanical science which has never been duly accredited. Thirty-three recognized collectors have visited or lived in Colorado and fifteen amateurs have collected in this region. I am excluding all workers in the Myxomycetes on account of the rather debatable taxonomic position occupied by this group of organisms.

There have appeared in recognized scientific journals several articles on Colorado fungi based on the collections made by one or more men over a period of one or two summers. Three of these articles are of importance, representing at least the beginning in the compilation of a check-list of Colorado fungi. Other papers are of minor importance, containing but scattered reports on a dozen or more fungi.

The first paper to appear dealing with fungi from this region was prepared by T. C. Porter and J. M. Coulter, 1874 (**1**). In their "Synopsis of the Flora of Colorado," they list, in addition to many hundred flowering plants, eleven fungi all of which were described by Peck. Another early paper was by Charles H. Peck, 1878 (**2**), in which he describes eleven new species of fungi from Colorado. Evidently, Peck never was in Colorado. Fungi collected in this state by T. S. Brandegee in 1877 were sent to E. S. Rau, Bethlehem, Pennsylvania, for identification. These fungi were, in turn, sent by Rau to Peck in New York. The third paper to appear in the literature was written by Ellis and Everhart in 1893. In their article entitled, "New west American fungi" (**3**), they describe ten new fungi collected in the vicinity of Fort Collins by C. F. Baker during the years 1892–1893. Baker was then with the Colorado Agricultural

[1] Read before the Botanical Section of the Colorado-Wyoming Academy of Science at the Laramie, Wyoming, meeting, November 26, 1927.

College, Fort Collins, Colorado. In 1899, T. D. A. Cockerell wrote a short article on the fungi of Custer County, Colorado (**4**). This article contains notes on the distribution and life-cycle of one smut, two rusts and one *Claviceps*.

All of the above mentioned collectors were mainly interested in the flowering plants of the region in which they were working. Collecting of fungi was purely incidental with them. The first article written by a mycologist who actually visited this state was by J. C. Arthur (**5**). Arthur and F. D. Kern came to Denver in the spring of 1907. Accompanied by E. Bethel, who was then located in Denver, these men collected rusts in the foot-hill region from Eldorado Springs to Boulder, Colorado; and also in the vicinity of Glenwood Springs, Colorado. Snow interfered with extensive trips throughout the state, but in their two-day trip they found several new rusts which were later described by F. D. Kern (**6**). Kern made a second collecting trip to Colorado in the summer of 1908 (**7**, **8**).

Fred J. Seaver made a trip to Colorado during the summer of 1910. Bethel of Denver accompanied Seaver on most of his collecting trips in this region. Collections were made at Tolland, Golden and Geneva Creek Canyon. Approximately 900 specimens of fungi were collected. Seaver published but one article on his collections which dealt entirely with the Discomycetes (**9**). He described four new species from Colorado.

A paper of more general nature appeared in 1919, in which all groups of fungi, except the rusts and smuts, were reported on. This paper was prepared by L. O. Overholts and represents the results of two summers' collecting (1913–'14) in the vicinity of Tolland and Denver, Colorado (**10**). His report was primarily a check list, but the author states: "A considerable amount of information was collected as to the altitudinal distribution, seasonal appearance, and other ecological data pertaining to the fleshy fungi, but its publication is withheld for the present with the hope of adding to it in the near future" (**11**). Overholts collected approximately 300 specimens of fungi and reports on 152 of these. This writer has made two additional trips to Colorado since his report was published; one in the summer of 1923, and a very short trip in 1926.

The last paper to appear, in which all groups of fungi are reported on, was by C. H. Kauffman (**12**). Kauffman spent the month of August, 1917, at Leal, Grand County, Colorado. In 1920, he made another trip to Colorado accompanied this time by two students. The latter summer was spent on the eastern slope and in the vicinity of Tolland, Colorado. He reports on 366 species of fungi, naming 12 new species, 2 new varieties and 2 new combinations.

Colorado fungi may be found in several standard herbarium collections which have been distributed, to some extent, throughout the United States. "*Cryptogamae Formationum Coloradensium*" is based on the collections of F. E. and E. S. Clements. These collections were made from various stations throughout the state from 1899 to 1907. "Plants of Colorado," distributed from the University of Wyoming, Laramie, Wyoming, contains many rusts collected by Leslie N. Goodding in 1903 and determined by J. C. Arthur. "Plants of Southern Colorado" contains some fungi collected by C. F. Baker from 1892 to 1899; and also some collections of fungi by D. M. Andrews, collected from 1895 to 1897. Ellis and Everhart identified all of Baker's fungi that appear in this collection. "Colorado Fungi," collected by C. S. Crandall from 1893 to 1899, contains approximately 200 different species. Crandall was then connected with the Colorado Agricultural College, Fort Collins, Colorado.

A history of mycological collectors in Colorado would not be complete unless we should include the work of the late Ellsworth Bethel. Bethel collected fungi in Colorado from 1894 to 1925, which date marked his untimely death. The last few months of Bethel's life were spent in the preparation of several papers, which, no doubt, would have contained much valuable information. After his death, Mrs. Bethel sent all of these unfinished papers, with a larger part of his cryptogamic herbarium, to the United States Department of Agriculture, Washington, D. C. The remaining part of his herbarium was divided between the University of Colorado and the Colorado Agricultural College.

Fred J. Seaver, in an article entitled "Ellsworth Bethel," states: "While the number of mycological articles accredited to him is surprisingly small, his collections have furnished the

groundwork for a number of articles contributed by other mycologists," and ". . . it is difficult to go far in the herbarium (New York Botanical Garden) without encountering fungi collected in Colorado by Bethel" (13).

The influence and personality of Ellsworth Bethel was more far-reaching than his publications. He was always ready to accompany and guide visiting mycological collectors to those grounds which his years of experience taught him to be the best in the state. Bethel accompanied on collecting trips all of the more outstanding mycological collectors who visited this state from 1893 to 1925. His name is found on collections from Colorado with those of Fred J. Seaver, E. Bartholomew, Arthur and Kern, L. O. Overholts, G. G. Hedgecock and C. L. Shear. Although his sudden death arrested the work of compiling and writing up the vast amount of information he had gathered throughout his years of collecting, his influence is indelibly written in the biological history of the state of Colorado.

Following is as complete a list of men who have collected fungi in the state of Colorado as I have been able to gather. In most cases, the date during which they collected in the state is included. In some instances, the dates are not definitely known by me:

Andrews, D. M.	1895–1897	Hartley, C.	1909–1912
Arthur, J. C.	1907	Hedgecock, G. G.	1909–1921
Baker, C. F.	1892–1899	Hodson, E. R.	?
Bartholomew, E.	1914	Humphreys, C. J.	1905 (?)
Bethel, E.	1894–1925	Kauffman, C. H.	1907 and 1920
Bessey, C. E.	1894–1899	Kern, F. D.	1907–1908
Brandegee, T. S.	1874–1878	Learn, C. D.	1920–1926
Clements, F. E. and E. S.	1899–1916	Longyear, B. O.	1913–1925
Cockerell, T. D. A.	1895–1900	Overholts, L. O.	1913–1914, '23 and '26
Coulter, J. M.	1872	Pammel, L. H.	1895–1897
Crandall, C. S.	1893–1899	Parry, C. C.	1861
Demetrio, C. E.		Porter, T. C.	1872
Duggar, B. M.	1916	Seaver, F. J.	1910
Earle, F. S.	1898	Shear, C. L.	1900
Evans, A. W.	1886–1887	Shelby, (?)	1900 (?)
Galloway, B. T.	1886–1887	Tracy, S. M.	1886–1887
Goodding, L. N.	1903	Trelease, W.	1886
Harper, E. T.	?	Underwood, L. M.	1901

From the "Mycological Notes" of C. G. Lloyd, I find that the following named persons have collected fungi in Colorado and sent the material to Lloyd for identification:

Bethel, E.	1916–1919	Overholts, L. O.	1914–1920
Hassler, F. A.	1912–1919	Patterson, F. W.	1916–1919
Harvey, B. T.	1913–1916	Smith, E. C.	1924
Hedgecock, G. G.	1920–1921	Sterling, E. B.	1898–1905
Knaebel, E.	1920–1921	Stevens, R. H.	1898–1905
Johnson, E. L.	1905–1908	Taylor, R. M.	1916–1919
Johnson, I. M.	1920–1921	Walker, S. B.	1913–1916
Longyear, B. O.	1913–1916		

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NEW MYCETOZOA FROM LONG ISLAND

ROBERT HAGELSTEIN

(WITH PLATE 26)

For the past five years the writer has been collecting and studying the Mycetozoa of Long Island, the extreme southeastern part of the State of New York and separated from the State of Connecticut by Long Island Sound. The Island is covered from end to end by the terminal moraine and glacial debris left by the last ice sheet, and the numerous kettle holes, swamps and wooded areas therein afford excellent collecting grounds, rich in many species. Several of the forms found cannot with certainty be assigned to accepted species and among them the following are believed to be sufficiently distinct to consider them as new.

Specimens from the typical fruitings have been placed in the Herbarium of The New York Botanical Garden.

Comatricha Rispaudii sp. nov.

Plasmodium? Sporangia sessile, cylindrical or clavate cylindrical, clustered in dense groups up to thirty or more sporangia, sometimes superimposed; color brown with a violet tinge; size 0.8 to 1.5 mm. high, 0.4 to 0.6 mm. thick. Sporangium wall evanescent but persisting at the base and frequently forming pseudo-cups which blend with the hypothallus. Columella dark brown, stout at the base but becoming slender, solid, sinuose and irregular, either extending to the apex or merging with the capillitium. The latter consists of branched and anastomosing brown threads spreading from all parts of the columella and generally coarsely meshed within. Spores pale violet brown, 8 to 9 μ diam., reticulated with narrow raised ridges 0.5 μ high. (PLATE 26, F. 1, 2, 3.)

On dead leaves. Collected in abundance in July 1927 in a wet, wooded kettle hole of the Long Island moraine near Albertson.

Named after Mr. Joseph Rispaud, who collected the species, and who has been the constant companion of the author in the field.

Comatricha Rispaudii has some resemblance to both *Diachea caespitosa* (Sturgis) Lister and *Diachea cylindrica* Bilgram, the capillitium being very much like that in the latter species. The columella, however, is solid and not tubular, the color brown and the beautifully reticulated spores entirely different. There is no evidence of a surface net to the capillitium. It is a *Comatricha*.

Cribraria laxa sp. nov.

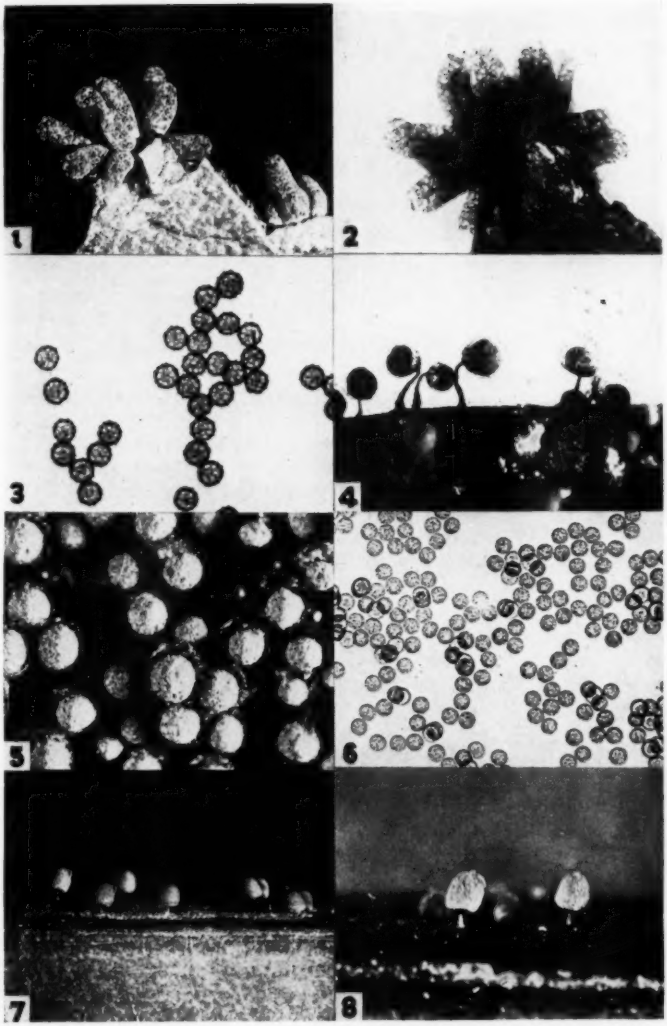
Plasmodium? Sporangia closely gregarious, stalked, globose, 0.5 to 0.7 mm. diam., nut brown; cup about one-third of the sporangium, consisting of many dark brown ribs joined near the top or connected by cross ribs and merging into the threads of the net, the ribs connected by a thin, partially evanescent membrane; net firm, regular, forming large triangular meshes 0.1 mm. or more along the sides; nodes numerous, dark brown, prominent, rounded or branching with few free rays and connected by from five to eight thin brown threads of the net. Stalk dark brown, firm, usually erect, one to two times the height of the sporangium. Spores ochraceous, distinctly warted, 6 to 7 μ diam. (PLATE 26, F. 4, 5, 6.)

On dead leaves in a kettle hole of the Long Island moraine near Albertson, August 1926 and July 1927.

This handsome species, found in the same kettle hole as *Comatricha Rispaudii*, is unusual among the species of *Cribraria* because of its habitat on leaves with the plasmodium in the substratum. During the years mentioned, a number of fruitings were collected all constant in characters and habitat. It resembles *C. intricata* in size and in the character of the well-developed net and nodes but the meshes of the net are very large; from four to nine times in area those of the latter species. The color, short stalk and cup with strong ribbing are more like those in *C. macrocarpa*. Were it not for the habitat and the large meshes of the net this form might well be considered intermediate between the other species mentioned, but a ground habitat is of great significance in the genus *Cribraria*, for the plasmodia of all other species of the genus inhabit wood only.

Arcyria insignis Kalchbr. & Cooke var. **dispersa** var. nov.

Sporangia scattered and separated, not clustered; otherwise as in normal *A. insignis*. (PLATE 26, F. 7, 8.)



MYCETOZOA FROM LONG ISLAND

On dead grass and stalks. Jones Beach State Park, Long Island.

The locality is on the Long Island barrier beach, a narrow strip of land covered with white sand and washed by the Atlantic Ocean. During the summer of 1928 considerable quantities of *A. insignis* were collected there on decaying beach grasses close to the sand and salt water, an unusual habitat for this species. Frequently the sporangia were not clustered but solitary and scattered, a half dozen or so on a blade of grass. These latter seem to be a distinct variation due to the environment and habitat, as inland on wood the sporangia are always clustered.

MINEOLA, NEW YORK

EXPLANATION OF PLATE 26

FIG. 1. Clustered group of sporangia of *Comatricha Rispaudii*. (× 9.)
FIG. 2. The same group as Fig. 1 but blown out to show columella and capillitium. (× 12.)
FIG. 3. Spores of *Comatricha Rispaudii*. (× 450.)
FIG. 4. Sporangia of *Cribraria laxa*. (× 15.)
FIG. 5. Sporangia of *Cribraria laxa*. (× 15.)
FIG. 6. Spores of *Cribraria laxa*. (× 450.)
FIG. 7. Sporangia of *Arcyria insignis* var. *dispersa*. (× 9.)
FIG. 8. Sporangia of *Arcyria insignis* var. *dispersa*. (× 15.)